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We invite you to read about innovations published and apply in your classroom. We also encourage you to develop your original creative ideas, prepare an article, and submit for review.

This particular issue includes a number of interesting classroom innovations in diverse areas.

Peter J. Billington
Editor

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Empowering Marginalized Communities: Enhancing Social Entrepreneurship Programs in Universities Through Access, Active Learning, and Content Innovation

Phani Tej Adidam, University of Nebraska at Omaha, USA
Xiaoming Yang, University of Nebraska at Omaha, USA
Vijayabaskar Masilamani, GITAM University, India
Nithin Sai Kolli, GITAM University, India
Usha Rani Budumuru, GITAM University, India

ABSTRACT

Universities are grappling with the task of establishing an effective academic framework for nurturing and educating social entrepreneurs. This gives rise to three critical research questions. First, how can we improve accessibility to social entrepreneurship programs within universities? Second, which learning model(s) would yield the greatest impact in cultivating social entrepreneurs? Finally, what specific content should take precedence in educating both current and future social entrepreneurs? To tackle these concerns, universities must open their doors to non-traditional students and facilitate the integration of actual social entrepreneurs into classrooms alongside their conventional peers. They should employ pedagogical tools that prioritize active learning, impart crucial soft skills, and advocate for both economic and intellectual diversity. Moreover, they should place emphasis on two key content areas—effectual logic and value co-creation—within their social entrepreneurship programs.

Keywords: Social entrepreneurship; universities; socially disadvantaged; active learning; effectual logic.

INTRODUCTION

In society, we can empower the disadvantaged sections by encouraging them to explore and be a part of the social enterprise ecosystem. The realm of social enterprise encompasses a diverse range of organizations, spanning from for-profit businesses engaged in socially beneficial activities to non-profit organizations conducting commercial activities in support of their mission (Defourny and Nyssens, 2006). In essence, social enterprises serve as vital agents in addressing societal issues while maintaining economic viability. It is evident in many social enterprises that individuals from vulnerable communities play a more active role (Galera and Borzaga, 2009). Consequently, social enterprises significantly contribute to fostering upward mobility and empowerment among disadvantaged and at-risk segments of society.

Social entrepreneurship manifests in various forms, with notable examples spanning diverse sectors. A compelling example is Grameen Bank, established by Muhammad Yunus, which offers microfinance services to empower impoverished individuals, particularly women, to start their own businesses and lift themselves out of poverty. In the realm of the health space, Loom is a social enterprise startup founded in 2020 that provides accessible mental health care through its online platform. With a mission to destigmatize mental health and increase access to therapy, Loom connects users with licensed therapists for affordable and convenient virtual sessions. By leveraging technology to remove barriers to mental health support, Loom exemplifies how startups can address pressing social needs while building scalable businesses. These ventures exemplify how social entrepreneurship combines innovative business strategies with a strong social or environmental mission to drive positive change.

Nevertheless, there is a pervasive lack of awareness and comprehension among students worldwide regarding the positive and transformative role that social enterprises play in society (Ganz, Kay, and Spicer, 2018). Consequently, it is imperative for universities to assume the role of champions for social enterprises. In doing so, universities cultivate the forthcoming cohort of social entrepreneurs and the essential stakeholders who support them, including government policymakers, civil society leaders, business professionals, and grassroots social workers. Furthermore, universities unquestionably contribute value to these social enterprises by equipping future professionals in fields such as marketing, finance, operations, and information systems, among others, with the necessary knowledge and skills.

There's a growing perspective advocating for business incubators to play a more active role in teaching social entrepreneurship within communities, rather than relying solely on universities (Deyanova et al., 2022). While universities indeed provide a robust environment for teaching social entrepreneurship, surpassing the resources

typically available in business incubators, their advantages are manifold. Firstly, they offer access to a diverse array of academic disciplines, fostering interdisciplinary learning essential for comprehending intricate social and environmental challenges. Secondly, universities cultivate a supportive ecosystem that nurtures experimentation and innovation, motivating students to craft sustainable business models deeply rooted in social impact. Moreover, universities often facilitate community engagement and collaboration, linking students with local nonprofits, government agencies, and other stakeholders to magnify their influence and tackle real-world issues collaboratively. Lastly, universities imbue students with a sense of social responsibility and ethical leadership, equipping them to navigate the intricacies of social entrepreneurship with integrity and a clear sense of purpose.

Regrettably, universities have encountered difficulties in developing an effective academic model for the creation and education of social entrepreneurs (Grau and Rockett, 2022). Even prior to the pandemic and throughout its duration, the structure of most classrooms remained largely unchanged, failing to adapt to the new realities faced by students. While the mode of instruction shifted towards remote or hybrid environments, the style of learning underwent minimal transformation (Morgan, 2021). The majority of students now find themselves listening to video lectures, attempting quizzes, completing term papers and assignments, and perhaps engaging in online discussions. However, what is noticeably absent is the opportunity for hands-on, experiential learning, which holds greater impact in teaching social entrepreneurship courses. Consequently, it comes as no surprise that student engagement has declined over the past two to three years (Instructure, 2022).

In addition to the diminished engagement caused by the pandemic, there exists another challenge concerning the distinct learning needs of social entrepreneurs compared to students pursuing traditional business professions. Wilson (2016) suggests that these individuals learn "most effectively through practical, non-conventional methods that extend beyond the confines of traditional academic settings." If we aspire to enhance the education of social entrepreneurs, it becomes essential to reassess the definition of a conventional student and embrace individuals from diverse backgrounds and varied academic training. However, this poses an inherent dilemma within universities, which adhere to stringent criteria for admitting and educating students. Even if certain universities were to welcome a different cohort of "students," the practices may encounter resistance from accreditation bodies.

Considering the prevailing constraints and circumstances, three pivotal research questions come to the forefront. Firstly, how can we broaden access to social entrepreneurship programs within universities? Secondly, which learning model(s) would be suitable to optimize the impact of such education in fostering the growth of social entrepreneurs? Lastly, what specific content should be emphasized in the education of present and future social entrepreneurs?

RESEARCH METHODOLOGY

In order to address these three inquiries, a survey was administered to twenty-eight entrepreneurship professors and sixty-four social entrepreneurs across the United States, Indonesia, Egypt, and Ghana (refer to Table 1 below). The selection of these professors was meticulous, taking into account their extensive research and teaching background in social entrepreneurship. It's worth noting that the average teaching experience and number of research papers varied by country, as indicated in Table 1. The sixty-four entrepreneurs were sourced from a prominent global database of social entrepreneurs. One hundred social entrepreneurs were approached, and sixty-four willingly participated in interviews for this research endeavor. The questions (please see Table 2) posed were designed to be open-ended in nature. The research team conducted these interviews via Zoom over the course of three months.

ANALYSIS AND FINDINGS

Expanding Access to Social Entrepreneurship Programs

Expanding access to social entrepreneurship programs is a pivotal step towards fostering innovation, addressing pressing societal challenges, and creating a more inclusive economic and educational environment. These programs equip aspiring changemakers with the knowledge, skills, and resources needed to develop and scale innovative solutions to complex social and environmental issues. By increasing accessibility to these programs, we can empower individuals from diverse backgrounds, including underserved communities and marginalized groups, to become effective agents of positive change (Tekula & Jhamb, 2015).

Table 1: Sample description of Social Entrepreneurship Professors and Entrepreneurs

	Social Entrepreneurship Professors		
Countries	Number of Professors	Average Number of Research Papers	Average Teaching Experience (in years)
USA	10	38	23
Indonesia	7	14	19
Egypt	6	18	12
Ghana	5	12	12

	Social Entrepreneurs		
Countries	Number of Social Entrepreneurs	Average Number of Social Enterprises	Average Experience of running a social enterprise (in years)
USA	24	3	12
Indonesia	17	2	14
Egypt	14	3	15
Ghana	9	3	19

One significant advantage of broadening access to social entrepreneurship programs is the potential for widespread impact on communities and societies. These programs provide individuals with the tools to identify and tackle pressing social issues, ranging from poverty and education gaps to environmental sustainability. By supporting social entrepreneurs, we not only catalyze local solutions but also stimulate economic growth and job creation. Additionally, many social entrepreneurship ventures adopt sustainable and ethical business models, demonstrating that it is possible to achieve positive societal outcomes while generating economic value.

Furthermore, increasing access to social entrepreneurship programs promotes equity and inclusivity in the entrepreneurial ecosystem. Historically, access to resources and networks has been limited, hindering the potential of entrepreneurs from underrepresented communities. By providing training, mentorship, and funding opportunities, we can level the playing field and ensure that individuals from all walks of life have the chance to turn their innovative ideas into impactful ventures. This inclusive approach not only benefits the entrepreneurs themselves but also contributes to building more resilient and socially cohesive communities (Tekula & Jhamb, 2015).

Moreover, expanding access to social entrepreneurship programs encourages a culture of collaboration and knowledge-sharing. By bringing together individuals with diverse perspectives and experiences, these programs create spaces for cross-pollination of ideas and the development of interdisciplinary solutions. This collaborative ethos fosters a sense of community among entrepreneurs, allowing them to draw upon one another's strengths and expertise. It also facilitates the exchange of best practices and lessons learned, strengthening the overall effectiveness and sustainability of social entrepreneurship initiatives. In this way, expanding access to social entrepreneurship programs not only supports individual entrepreneurs but also cultivates a more vibrant and interconnected ecosystem for social innovation (Roslan et al., 2022).

In our study, there is a growing consensus among professors and social entrepreneurs that universities need to dismantle the traditional barriers of "meritocracy" and expand access to a distinct student segment composed of actual social entrepreneurs. These social entrepreneurs should be invited into classrooms whenever feasible and encouraged to study alongside traditional students. It is evident that social entrepreneurs possess a profound understanding of the social issues they aim to address and are uniquely positioned to generate solutions for social change. However, most universities exclude individuals who lack the requisite academic qualifications from participating in such programs. Each student must meet specific criteria to secure a place in the classroom. Consequently, social entrepreneurship programs at universities tend to have less diverse student bodies in terms of life experiences and limit access to those

who are potentially tackling grassroots social problems. Indeed, without the involvement of actual social entrepreneurs, the learning experience may fall short in exploring optimal solutions to social issues.

Table 2: Survey questions addressed to Social Entrepreneurship Professors and Entrepreneurs

Questions -- **Professors of Social Entrepreneurship**
Describe the criteria or process your institution uses for selecting students into your social entrepreneurship program. How do you increase access to such programs?
How do you integrate practical experience or real-world application into your classroom teaching of social entrepreneurship?
What specific teaching methods or learning styles do you find most effective in engaging students in social entrepreneurship concepts and practices?
Could you elaborate on any unique or innovative approaches your program takes in curriculum design to address the multifaceted aspects of social entrepreneurship?
What content do you incorporate into your teaching of social entrepreneurship?
How do you balance theoretical knowledge with practical skills development in your social entrepreneurship curriculum?
What strategies do you employ to ensure inclusivity and diversity within your program, both in terms of student selection and curriculum content?
What types of partnerships or collaborations do you establish with external organizations or stakeholders to enhance the learning experience for students in your program?

Questions -- **Social Entrepreneurs**
From your experience as a social entrepreneur, what support or resources do you believe universities could offer to help early-stage ventures like yours thrive?
Reflecting on your journey, what deficiencies have you encountered in terms of support from academic institutions, and how do you think universities could address these gaps effectively?
In what ways do you envision universities fostering stronger connections between social entrepreneurs and academic researchers or experts to facilitate knowledge exchange and collaboration?
Could you provide examples of successful university-led initiatives or programs that have significantly contributed to the growth and impact of social enterprises, and what key elements made them effective?
How do you think universities can better integrate practical, hands-on experiences, such as internships or incubator programs, into their curriculum to support aspiring social entrepreneurs?
Considering the unique challenges faced by social entrepreneurs, what specific forms of mentorship or guidance do you believe universities should offer to help navigate these challenges successfully?
What role do you think universities can play in facilitating access to funding and investment opportunities for social enterprises, and what improvements could be made in this regard?
From your perspective, what opportunities exist for universities to leverage their research capabilities and academic expertise to address pressing social and environmental issues in collaboration with social entrepreneurs?
How can universities better promote interdisciplinary collaboration and cross-sector partnerships to foster innovation and collective impact within the social entrepreneurship ecosystem?
Looking forward, what innovative approaches or initiatives would you like to see universities adopt to better support the growth and sustainability of social enterprises, while also addressing systemic challenges in society?

During interviews, several instances were highlighted where professors shared how social entrepreneurs from underprivileged communities inspired traditional students with their determination, sincerity, and enthusiasm in seeking innovative solutions to their unique challenges, such as healthcare accessibility and sustainable farming. As these social entrepreneurs achieved success, other members of their communities were motivated to follow in their footsteps and establish social enterprises.

The crucial takeaway from this is that the effectiveness of social entrepreneurship programs hinges on actively engaging individuals at the grassroots level of social problems. By involving them as essential partners in the search for innovative solutions, they can also serve as catalysts in establishing a thriving and sustainable economic foundation for prosperity. These individuals become role models and lay the groundwork for a significant upsurge in entrepreneurial endeavors. Therefore, university social entrepreneurship programs must prioritize the education and support of aspiring social entrepreneurs from the most economically disadvantaged and socially excluded groups.

Learning Models

Learning models encompass a wide range of pedagogical approaches and strategies that are employed to facilitate the acquisition of knowledge and skills. These models serve as blueprints for designing educational experiences, taking into account factors such as the learner's characteristics, the subject matter, and the desired learning outcomes. One widely used model is the traditional lecture-based approach, where an instructor imparts information to a group of students. While this method is effective for conveying foundational knowledge, it may not always promote deep understanding or critical thinking. In contrast, inquiry-based models encourage students to actively explore and investigate concepts, fostering curiosity, problem-solving skills, and a deeper engagement with the subject matter (Joyce et al., 2008)

Another prominent learning model is experiential or hands-on learning. This approach emphasizes practical application of knowledge through activities like experiments, simulations, and real-world projects. It provides students with opportunities to apply theoretical concepts in tangible situations, enhancing their comprehension and retention of the material. Additionally, experiential learning promotes skills such as teamwork, critical thinking, and decision-making. In recent years, technology-enhanced models, such as blended learning and flipped classrooms, have gained prominence. These models incorporate digital resources and online platforms to complement traditional instruction, offering a more flexible and personalized learning experience. Blended learning combines face-to-face instruction with online components, while flipped classrooms reverse the typical learning sequence by delivering instructional content online before in-person discussions and activities. This enables students to learn at their own pace and provides additional resources for reinforcement and review (Suartama et al., 2019).

Given this background, how do we develop learning models to create outstanding social entrepreneurs? What kind of learning experiences would be appropriate for those who have no formal education or training? How do we balance the intellectual rigor that traditional students deserve with the hands-on relevance that our social entrepreneurs seek?

According to several respondents, emphasis on active learning is key to a successful social entrepreneurship program. Additionally, learning gets enhanced when there is a focus on soft skills in an intellectually and economically diversified classroom.

Active Learning

Active learning is a pedagogical approach that places emphasis on student engagement and participation in the learning process. Unlike traditional passive learning methods where students are primarily recipients of information, active learning encourages them to take an active role in their education. This approach involves various techniques such as discussions, problem-solving exercises, case studies, group projects, and hands-on activities. By doing so, active learning aims to stimulate critical thinking, promote deeper understanding, and enhance retention of information. This method is particularly effective in fostering a dynamic and interactive learning environment, where students are not only absorbing knowledge but also actively applying and synthesizing it (Felder & Brent, 2009).

One key feature of active learning is its ability to cater to diverse learning styles and preferences. It acknowledges that individuals have different ways of processing information and engages them through various means. For instance, kinesthetic learners benefit from hands-on activities, while visual learners thrive in environments that utilize visual aids and diagrams. This inclusive approach ensures that students of all backgrounds and abilities have the opportunity to excel. Moreover, active learning cultivates a sense of ownership over one's education, empowering students to take

control of their learning journey and encouraging them to ask questions, seek clarification, and explore concepts independently.

Furthermore, active learning promotes critical thinking and problem-solving skills. By actively engaging with the material, students are prompted to analyze, evaluate, and apply knowledge in practical contexts. They are encouraged to ask probing questions, challenge assumptions, and consider alternative perspectives. This fosters a deeper understanding of the subject matter, as students are not simply memorizing facts, but actively grappling with concepts. In addition, active learning often involves collaborative activities, which provide opportunities for students to work together, share ideas, and learn from one another. This collaborative aspect not only enhances social skills but also exposes students to a range of viewpoints, enriching their learning experience.

Active learning has also been shown to improve long-term retention of information. Research indicates that students who actively participate in the learning process are more likely to remember and apply what they have learned compared to those in passive learning environments. This is because active learning requires students to constantly engage with the material, reinforcing their memory pathways. Additionally, the hands-on nature of active learning often involves real-world applications, making the knowledge more tangible and relevant to students' lives. As a result, they are better equipped to retain and apply their learning beyond the classroom setting (Felder & Brent, 2009).

In a social entrepreneurship program, students could work together (case studies, role plays, and structured team-based learning) or individually (reflections, self-assessments, writing journals, etc.). The more popular active learning tool relates to case studies and storytelling.

Irrespective of the cognitive maturity of individuals, students learn a lot through stories rather than theory-based academic teaching. Via real case studies, gleaned from the actual social enterprises of the in-class participants, students can understand the situation, develop alternative solutions depending on the availability of resources, take actions, and then reflect and learn by assessing the outcomes. These lessons will stick for a much longer time in the consciousness of these social entrepreneurship students. They are able to access, analyze and imbibe lessons from the first-hand experiences of fellow students via a unique co-creation of knowledge. Some programs focus on the “think-pair-share” tools where a social entrepreneur (who might have last attended a class when s/he was 16 years old) is paired with an MBA student (with seven years of managerial work experience) (Lyman, 1981). This activity allows the pair to check their understanding of recent material, practice a skill or highlight gaps in their knowledge before moving to the next section.

During an active learning session at a university in Ghana, students immersed themselves in addressing crucial societal challenges through simulation exercises. They delved into two simulations: the first aimed at enhancing rural healthcare access, while the second focused on promoting sustainable agriculture to combat food insecurity. Collaborating with social entrepreneurs in the classroom, students crafted detailed business plans tailored to Ghana's unique context, considering factors like local customs, infrastructure, and economic realities. Throughout the exercise, they grappled with Ghana-specific obstacles, from bureaucratic red tape to intricate community dynamics. By actively engaging in this hands-on approach, students not only gained practical insights into social entrepreneurship but also developed a profound appreciation for the complexities of addressing local social issues.

Focus on Soft Skills

Soft skills, often referred to as interpersonal or people skills, are a set of non-technical attributes that play a crucial role in personal and professional success. These skills encompass a wide range of abilities including communication, teamwork, adaptability, problem-solving, leadership, and emotional intelligence. They are essential in various aspects of life, from building strong relationships to excelling in the workplace. In fact, in today's rapidly changing global economy, soft skills are increasingly valued by employers, often considered equally as important as technical skills. They are the foundation for effective collaboration, leadership, and personal development (Heckman & Kautz, 2012).

One of the key aspects of soft skills is their impact on communication. Effective communication is fundamental in both personal and professional relationships. It involves not only the ability to articulate thoughts and ideas clearly but also to listen actively and empathetically. Strong communication skills facilitate understanding, resolve conflicts, and foster positive connections with others. In a professional context, this can lead to improved teamwork, increased productivity, and a more harmonious work environment. Moreover, in leadership roles, the ability to communicate effectively is essential for motivating and guiding a team towards achieving common goals.

Adaptability and problem-solving are also critical soft skills in today's rapidly changing world. As industries and technologies evolve, individuals must be able to adapt to new situations, technologies, and environments. Those who are flexible and open to change are more likely to thrive in dynamic and unpredictable work environments. Additionally, problem-solving skills enable individuals to analyze challenges, devise effective solutions, and make informed decisions. This ability is invaluable in both personal life and the professional world, where the capacity to navigate complex situations and find innovative solutions can lead to significant achievements and progress.

Furthermore, soft skills contribute significantly to emotional intelligence, which is the capacity to recognize, understand, and manage our own emotions, as well as understand and influence the emotions of others. Emotional intelligence is crucial in building strong, positive relationships, as it enables individuals to empathize with others, communicate effectively, and navigate social situations with sensitivity and tact. It is particularly important in leadership positions, where the ability to inspire, motivate, and guide a team depends on a leader's emotional intelligence. Overall, soft skills are the cornerstone of personal and professional growth, enabling individuals to navigate life's challenges with confidence, empathy, and resilience (Heckman & Kautz, 2012).

As per insights from various professors, many social entrepreneurship programs predominantly emphasize hard skills like fundraising, customer acquisition, operations management, financial acumen, and talent identification. However, there's a growing recognition that these programs should equally prioritize the development of soft skills such as leadership, optimism, resilience, creativity, empathy, and emotional intelligence. These skills are essential for navigating through adversities, overcoming challenges, and bouncing back from failures in the dynamic landscape of social entrepreneurship.

It's worth noting that while hard skills can be taught and honed over time, soft skills pose a greater challenge as they are closely tied to an individual's character rather than mere knowledge or expertise (Faisal et al., 2022). Therefore, enhancing soft skills requires deliberate effort, ongoing practice, and a commitment to self-improvement (Faisal et al., 2022). While hard skills may enhance one's LinkedIn profile, it's the soft skills that truly distinguish one social entrepreneur from another. Hence, it's crucial to emphasize the key learning outcomes identified across various programs, highlighting the key learning outcomes related to effective communication, critical thinking, teamwork, empathy, leadership, and resilience as essential qualities for success in the field of social entrepreneurship.

Intellectual and Economic Diversity

The intellectual and economic diversity of students is critical to the success of learning. In a classroom setting, both intellectual and economic diversity play pivotal roles in fostering a rich and inclusive learning environment. Intellectual diversity brings together students with varied perspectives, experiences, and ways of thinking. This diversity of thought stimulates critical thinking and promotes a deeper understanding of complex subjects. It encourages students to engage in lively discussions, challenge assumptions, and learn from one another. When students are exposed to a range of viewpoints, they become better equipped to navigate the complexities of the world beyond the classroom, developing the skills necessary for effective communication and collaboration in diverse professional settings (Lunenburg & Lunenburg, 2014).

Economic diversity in a classroom is equally important. It ensures that students from various socioeconomic backgrounds have access to quality education and resources. This inclusivity is fundamental in promoting equal opportunities for all students, regardless of their financial circumstances. It also helps create a more balanced and representative learning environment, reflecting the broader demographics of society. Economic diversity encourages the sharing of experiences and perspectives related to economic realities, fostering empathy, understanding, and a sense of community among students. Additionally, it prepares students to engage with and contribute to a workforce characterized by economic diversity (Gupta, Garg & Kumar, 2018).

Together, intellectual and economic diversity enhance the overall educational experience. Students are exposed to a wider range of ideas and approaches, which broadens their horizons and prepares them for the challenges of an interconnected and diverse world. It promotes a culture of inclusivity and mutual respect, where students learn to appreciate the value of different perspectives. Moreover, this diversity encourages creativity and innovation, as students draw upon their unique backgrounds and knowledge to tackle problems and generate new ideas. By recognizing and embracing both intellectual and economic diversity in the classroom, educators lay the foundation for a more enriched and equitable learning environment that prepares students for success in their future endeavors.

In this spirit, as mentioned earlier, pairing an MBA student with a "semi-literate" social entrepreneur leads to a high level of knowledge co-creation which stimulates long-term learning. Variety and diversity in a classroom setting cannot be overemphasized (Johnson, 2019). A social entrepreneur's asset is the network of individuals that s/he knows. Along with learning with and from each other, these participants create strong relationships, and share their networks with one another in a much more meaningful way. Only in such social entrepreneurship programs, participants can create much needed diversity in their networks. This mutual benefit leads to the social problem being addressed in a holistic manner.

Content of Social Entrepreneurship

Once the participants and pedagogical structure of social entrepreneurship programs have been addressed, it is essential to shift attention towards the third critical aspect: content. While traditional entrepreneurship programs cover important topics such as opportunity analysis, business scalability, funding acquisition, talent procurement, ethical dilemmas, and customer connectivity, social entrepreneurs operate in environments of heightened uncertainty. Therefore, the question arises: What should a program prioritize to drive the performance and innovation of social ventures? Based on insights gathered from interviews, two key enablers of successful social ventures are *effectual logic* and *value co-creation*. Unfortunately, these content areas are often overlooked and therefore need to be prominently featured in social entrepreneurship programs.

In order to drive social innovation effectively, social ventures must navigate decision-making amidst significant uncertainty and explore alternative methods of organizing. Effectual logic, described as a dynamic and interactive process of creating new artifacts in the world (Sarasvathy, 2008: p. 6), plays a crucial role in helping social ventures identify alternative organizational approaches to drive social innovation. This approach aligns with emergent strategy (Chandler et al. 2011), wherein entrepreneurs start with a broad aspiration and navigate towards it using available means such as personal attributes, knowledge, and networks (Perry, Chandler, and Markova, 2012).

Effectual logic is indeed a distinct approach to decision-making and problem-solving, particularly in entrepreneurial contexts. This framework diverges from the traditional causal logic, which emphasizes predicting and planning for a desired future outcome. Instead, effectual logic acknowledges the inherent uncertainty and complexity of entrepreneurial endeavors, and centers on leveraging existing resources, skills, and relationships to create opportunities. It begins with a focus on what is within one's control and builds from there, allowing for adaptability and responsiveness to emerging possibilities.

One of the key principles of effectual logic is the concept of the "Bird-in-Hand" principle. This principle suggests that entrepreneurs should start with what they have readily available, such as their own skills, interests, and networks, rather than fixating on external resources that may or may not be attainable. By leveraging their existing assets, entrepreneurs can initiate action and create value, even in the absence of extensive resources or a detailed roadmap. This approach encourages a mindset of resourcefulness and creativity, enabling entrepreneurs to make progress with limited initial means (Sarasvathy 2008).

Effectual logic also emphasizes the importance of forming partnerships and collaborations. Entrepreneurs utilizing this framework recognize that they don't have to go it alone. Instead, they seek to engage with others who share a common vision or can contribute complementary skills and resources. Through co-creation and cooperation, entrepreneurs can expand their capabilities and access a broader network of support. This collaborative aspect not only enhances the likelihood of success but also fosters a sense of community and mutual benefit within the entrepreneurial ecosystem. Overall, effectual logic provides a practical and adaptable framework for navigating the complexities and uncertainties of entrepreneurship, emphasizing action, resourcefulness, and collaboration as key drivers of success.

Social ventures that embrace effectual logic are better equipped to navigate unknown contexts and think creatively to drive social innovation (Servantie and Rispal, 2018). By fostering relationships beyond their immediate networks, ventures with effectual logic can form unexpected partnerships and adopt fresh approaches to existing problems (Dew et al., 2009). Consequently, value co-creation, which involves the joint creation of value between the firm and stakeholders (Prahalad and Ramaswamy, 2004), becomes a significant outcome of effectual logic in social ventures.

Value co-creation is a dynamic concept that redefines the traditional view of value exchange between entrepreneurs and their customers. It recognizes that value is not solely created by the firm and delivered to the customer, but rather, it is a collaborative process involving both parties. This approach emphasizes active engagement and interaction

between the entrepreneur and his/her customers, allowing for the customization and personalization of products or services to better meet individual needs and preferences. By involving customers in the co-creation process, entrepreneurs can tap into a deeper understanding of customer desires, resulting in higher levels of satisfaction, loyalty, and ultimately, sustained entrepreneurial success (Saha et al., 2020)

One of the key elements of value co-creation is the integration of customer insights and feedback into the product or service development process. This means actively listening to customer needs, preferences, and pain points, and using this information to inform decision-making. By involving customers in the design phase, businesses can create offerings that are more aligned with actual market demands, leading to higher levels of customer satisfaction and loyalty. Additionally, this collaborative approach often leads to the development of innovative solutions that can set an enterprise apart in a competitive market (Yen et al., 2020).

Furthermore, value co-creation extends beyond the product or service itself to encompass the entire customer experience. It acknowledges that value is not limited to the tangible features of a product, but also includes the emotional and experiential aspects of the interaction. This means considering elements like ease of use, customer support, and overall satisfaction with the brand. By actively involving customers in shaping their own experiences, businesses can create deeper connections and foster a sense of ownership and loyalty among their customer base. In essence, value co-creation transforms the relationship between entrepreneurs and customers from a transactional one to a collaborative partnership, leading to mutual benefits and sustained success.

In the context of social entrepreneurship, value co-creation enables both the social venture and its partners, including donors, beneficiaries, and government agencies, to generate outcomes that surpass what each entity could achieve independently. As social ventures pursue simultaneous social and economic objectives, value co-creation becomes a crucial behavior that empowers the firm to drive social innovation despite operating with limited resources in uncertain contexts (Yang et al., 2022). Thus, social entrepreneurship programs must emphasize the importance of effectual logic and value co-creation in their content.

CONCLUSION

Universities play a pivotal role in empowering disadvantaged individuals to engage in the social entrepreneurship ecosystem, yet globally, they face challenges in devising effective programs for this purpose. Leading institutions like the University of Oxford's Skoll Centre for Social Entrepreneurship, Stanford University's Stanford Social Innovation Review (SSIR), and Melbourne Business School's Yunus Social Business Centre are at the forefront of addressing this challenge. However, there remains significant room for improvement. This paper advocates for a comprehensive approach, presenting a three-pronged strategy for universities to design successful social entrepreneurship programs. Drawing on insights from a diverse array of professors and social entrepreneurs, it suggests innovative practices such as integrating real social entrepreneurs into classrooms alongside traditional students, employing pedagogical tools that prioritize active learning and soft skill development, and embracing economic and intellectual diversity. Additionally, the paper underscores the importance of emphasizing effectual logic and value co-creation as central content areas within these programs.

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Author bios:

Phani Tej Adidam is a Professor and Chairman of Marketing and Entrepreneurship at the University of Nebraska at Omaha. He is a Fulbright Scholar and received his PhD in Marketing from Texas Tech University, and his research has been published in various esteemed journals including Journal of Marketing, Journal of International Marketing, Journal of Marketing Management, Journal of Consumer Behavior, and Journal of Social Entrepreneurship.

Xiaoming Yang is an Associate Professor of Entrepreneurship at the University of Nebraska at Omaha, specializing in entrepreneurship and innovation in emerging economies. He received his PhD in Entrepreneurship and Innovation from the University of Missouri - Kansas City, and his research has been published in various esteemed journals including Small Business Economics, Industrial Marketing Management, and Journal of Social Entrepreneurship.

Vijayabaskar Masilamani is an Assistant Professor at GITAM School of Business, GITAM University, India. With over a decade of corporate experience, he specializes in technology business incubation, startup promotion, market consulting, and new product development. He holds a Ph.D. from VIT Business School, India, with recent publications in the Journal of Social Entrepreneurship.

Nithin Sai Kolli is an Assistant Professor at GITAM School of Business, GITAM University, India, with expertise in teaching and assisting in incubation activities, spanning five years. He actively networks with Andhra Pradesh-based organizations to promote social entrepreneurship initiatives and has prior industry experience. He has also contributed to research, with recent publications in the Journal of Social Entrepreneurship.

Usha Rani Budumuru is a scholar at GITAM University, specializes in Social Entrepreneurship, and holds a Master's in Rural Development and Governance from Tata Institute of Social Sciences (TISS). With three years of experience in incubation centers, she published a research article in the Journal of Social Entrepreneurship.

Exploring User Interaction Satisfaction with ERPsim Games Used in Learning About ERP Systems

Sung J. Shim, Seton Hall University – South Orange, New Jersey, USA

ABSTRACT

This study attempts to evaluate user interaction satisfaction with ERPsim games, using data from a survey of graduate students who used ERPsim games in a course on enterprise resource planning (ERP) systems. The results show that the respondents are satisfied with user interaction with the ERPsim game. The results also show that the areas of screen factors, terminology, and system information, learning factors, and usability and user interface are found to have positive effects on the overall reactions to the ERPsim game, while the area of system capabilities is found to have no effect on the overall reactions to the ERPsim game. The results of this study would be helpful to those who use ERPsim games as instructional and learning tools as well as those who design user interaction of ERPsim games and further SAP ERP system on which ERPsim games run.

Keywords: User interaction, user satisfaction, ERPsim games, ERP systems

INTRODUCTION

ERPsim is a set of computer-based simulation games for SAP enterprise resource planning (ERP) system in which participants use the system to manage their virtual company in a competitive market (ERPsimLab, 2024). ERPsimLab at HEC Montréal developed ERPsim games. More than 225 universities worldwide as well as many corporations have used the games as instructional and learning tools (Léger et al., 2021). While many students and businesspeople have come to use ERPsim games in learning about SAP ERP system and business processes supported by the system, little is known about how much users are satisfied with user interaction with ERPsim games and what areas of user interaction with ERPsim games users are satisfied with or not.

The objective of this study is to examine the extent to which users are satisfied with various areas of user interaction with ERPsim games. On a theoretical level, this study can help advance our understanding of user interaction as being associated with ERPsim games and SAP ERP system on which ERPsim games run and extend the line of research on computer self-efficacy and use. On a practical level, this study can help understand and improve user interaction with ERPsim games on the part of developers as well as enhance user experiences with ERPsim games as instructional and learning tools with reasonable expectations of user interaction on the part of users.

CONCEPTUAL BACKGROUND

User Interaction Satisfaction

This study attempts to extend the line of studies on computer self-efficacy into user interaction satisfaction with ERPsim games. Computer self-efficacy is defined as a user's ability to use the computer to perform a specific task (Compeau and Higgins, 1995; Marakas et al., 1998; Mouakket, 2010). Studies on computer self-efficacy suggest that computer self-efficacy is a significant determinant of an individual's intention to use computers (Mouakket, 2010; Venkatesh and Davis, 2000; Hung and Liang, 2001). A wide body of studies has examined computer self-efficacy as it is associated with ERP systems. For example, Mouakket (2010) shows that computer self-efficacy has a significant effect on ease of use of ERP systems, which in turn has a positive effect on the use of ERP systems. Park et al. (2007) report on the positive impact of ERP systems on the absorptive capacity of users. Elkhani et al. (2014) also show that computer self-efficacy has a positive effect on usefulness and ease of use of ERP systems, which in turn has a positive effect on the use of ERP systems.

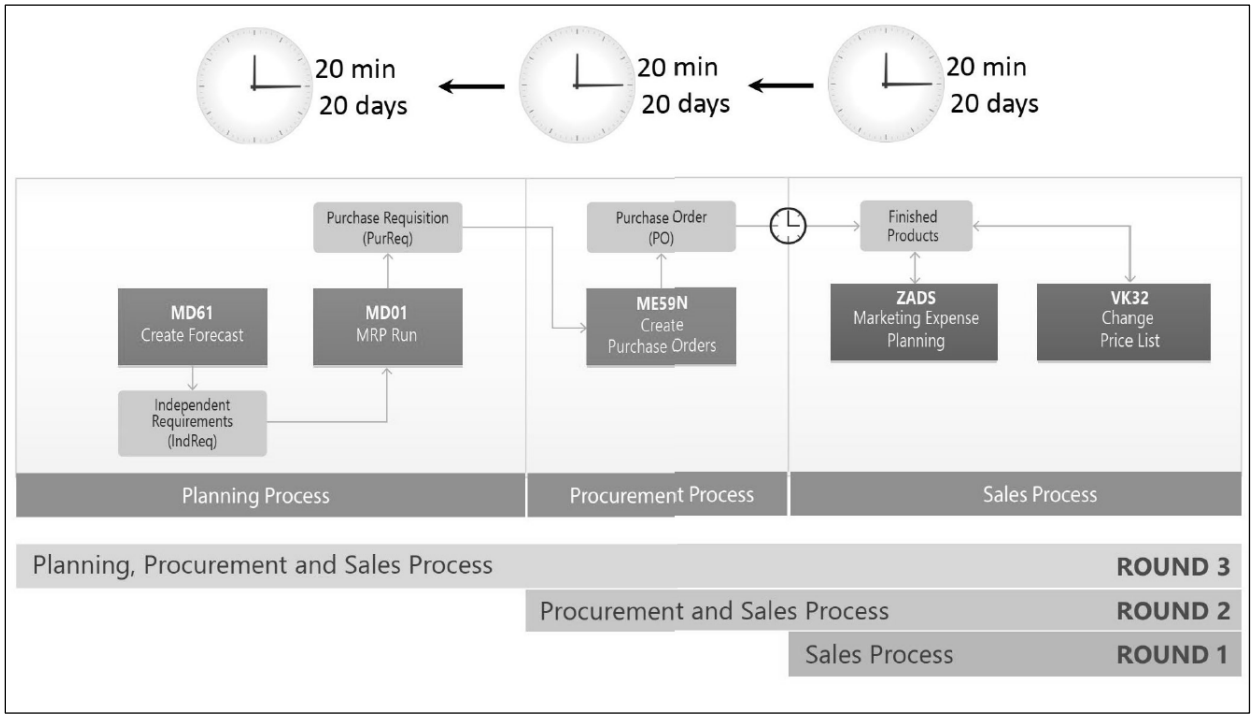
While previous studies have examined computer self-efficacy being associated with ERP systems, few have studied the constructs of user interaction as they relate to computer self-efficacy of ERPsim games that run on SAP ERP system. Understanding user interaction satisfaction with ERPsim games is crucial to the successful use of ERPsim games as instructional and learning tools on the part of users and to the effective improvement of user interaction of ERPsim games and SAP ERP system on the part of developers.

For this study, we use the items of constructs of user interaction satisfaction adopted from Questionnaire for User Interaction Satisfaction (QUIS). Since QUIS was developed at Human-Computer Interaction Laboratory of the University of Maryland at College Park (Chin et al., 1988), many studies have used it in assessing user perception, interaction, and usability of various computer-based systems, for example, user perception of digital library (Frias-Martinez et al., 2007), consumer evaluations of internet service quality (Lee, 2002), and user experiences with automatic video retrieval technology (Petrelli and Auld, 2008).

ERPsim Games

ERPsimLab at HEC Montreal provides several editions of ERPsim games including Distribution (now replaced with Maple Introduction Game), Logistics (Introduction, Extended, and Platinum), Manufacturing (Introduction, Extended, and Advanced), and Retail (Introduction and Extended) Games. All ERPsim games use SAP ERP system. SAP ERP system leads the ERP market with more than twelve million users in more than 121,000 installations worldwide (Lauchlan, 2022). For this study, we used ERPsim Distribution Game, while we plan to extend the study to other ERPsim games in the future. Figure 1, which was adopted from Léger et al. (2021), shows the layout of ERPsim Distribution Game. In the game, participants operate the process of planning, procurement, and sales of a wholesale distribution company that sells bottled water in Germany. The game runs for three rounds with each round running for twenty virtual days (1 minute per day). Figure 2 shows the transactions that participants perform in each round and the reports that they can use to make decisions when performing the transactions. Léger et al. (2021) provide more details of ERPsim Distribution Game.

Figure 1: Layout of ERPsim Distribution Game



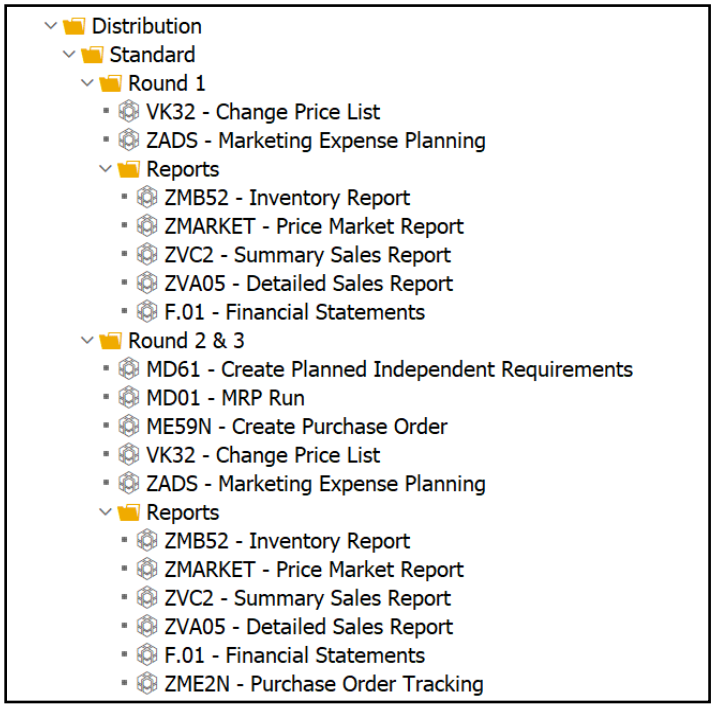
RESEARCH DESIGN

Table 1 shows the QUIS measures in six areas of user interaction including: (1) screen factors, (2) terminology and system information, (3) learning factors, (4) system capabilities, (5) usability and user interface, and (6) overall reactions to the system, and the items of each measure and their scales. One item of the screen area and another item of the overall reaction to the ERPsim system were dropped (crossed out in Table 1) in this study, as they are irrelevant to the ERPsim game. Each item measures the user's satisfaction with the respective interaction area on a 9-point scale.

Data for this study was collected from a survey of forty-three graduate students who took a course on ERP systems. Students filled in the survey in the last week of the semester after they practiced with SAP ERP system for various

business processes including procurement, production planning and execution, fulfillment, and warehouse and inventory management and then used ERPsim Distribution Game in the last week of the class. Data collected was analyzed in three steps. First, we calculated the descriptive statistics of the items of six constructs of user interaction satisfaction. Second, we performed factor analysis on six constructs to see the appropriateness of psychometric properties of the constructs. Third, we performed regression analyses to explore any effect of each of five constructs (excluding the construct of overall reactions) as a predictor on the construct of overall reactions.

Figure 2: Transactions and Reports of ERPsim Distribution Game



RESULTS AND DISCUSSION

Table 2 shows the mean values and standard deviations of the items of six constructs of user interaction satisfaction. It is worth noting that the mean values do not vary much across the six constructs, ranging from 5.6585 to 7.8571. The respondents in general seem satisfied with user interaction with the ERPsim game, while there is still room for improvement in all six constructs. The construct of usability and user interface (V5) shows the highest satisfaction, whereas the construct of system capabilities (V4) shows the lowest satisfaction. Two items – system speed and system reliability – in the construct of system capabilities (V4) show the lowest satisfaction among all the items. The low satisfaction with these two items may be due to such technical issues as Internet connection and remote servers, as ERPsim games use remote ERPsim servers via the Internet.

Table 3 shows the results of factor analysis performed on six constructs of user interaction satisfaction. Overall, the psychometric properties of the items of six constructs seem appropriate. QUIS seems highly reliable across diverse types of user interaction, as noted by the QUIS developers (Chin et al., 1988).

Table 4 shows the results of regression analysis of each construct as a predictor on the construct of overall reactions to the ERPsim game. Each of the four constructs including those of screen factors (V1), terminology and system information (V2), learning factors (V3), and usability and user interface (V5) has a significant positive effect on the construct of overall reactions to the ERP game (V6), indicating all these four constructs are significant predictors for the construct of overall reactions to the ERPsim game. However, the construct of system capabilities (V4) has no significant effect on the construct of overall reactions to the ERPsim game (V6). This result is interesting, as the construct of system capabilities (V4) also shows the lowest satisfaction among the six constructs (see Table 2).

Table 1: QUIS Constructs and Items of User Interaction Satisfaction

Variables	9-point scale	
Screen (V1)		
Characters on the computer screen	1 - hard to read	9 - easy to read
~~Highlighting on the screen simplifies task~~	~~1 - not at all~~	~~9 - very much~~
Organization of information on the screen	1 - confusing	9 - very clear
Sequence of screens	1 - confusing	9 - very clear
Terminology and system information (V2)		
Use of terms throughout system	1 - inconsistent	9 - consistent
Terminology is related to the task you are doing	1 - never	9 - always
Position of messages on screen	1 - inconsistent	9 - consistent
Messages on screen which prompt user for input	1 - confusing	9 - very clear
System keeps you informed about what it is doing	1 - never	9 - always
Error messages	1 - unhelpful	9 - helpful
Learning (V3)		
Learning to operate the system	1 - difficult	9 - easy to read
Exploring features by trial and error	1 - difficult	9 - easy to read
Remembering names and use of commands	1 - difficult	9 - easy to read
Tasks can be performed in a straight-forward manner	1 - never	9 - always
Help messages on the screen	1 - unhelpful	9 - helpful
Supplemental reference materials (such as Job Aid)	1 - confusing	9 - very clear
System capabilities (V4)		
System speed	1 - too slow	9 - fast enough
System reliability	1 - unreliable	9 - reliable
System tends to be: noisy to quiet	1 - noisy	9 - quiet
Correcting mistakes	1 - difficult	9 - easy
Experienced and inexperienced users' needs are taken into consideration	1 - never	9 - always
Usability and user interface (V5)		
Use of colors and sounds	1 - poor	9 - good
System feedback	1 - poor	9 - good
System response to errors	1 - awkward	9 - gracious
System messages and reports	1 - poor	9 - good
System clutter and user interface "noise"	1 - poor	9 - good
Overall reactions to the ERPsim system (V6)		
Terrible to wonderful	1 - terrible	9 - wonderful
Difficult to easy	1 - difficult	9 - easy
Frustrating to satisfying	1 - frustrating	9 - satisfying
~~Inadequate to adequate power~~	~~1 - inadequate power~~	~~9 - adequate power~~
Dull to stimulating	1 - dull	9 - stimulating
Rigid to flexible	1 - rigid	9 - flexible

Table 5 shows the inter-correlations among the six constructs of interest. All the correlations are found to be significant, except the correlations between the construct of system capabilities (V4) and the other five constructs. The construct of system capabilities (V4) even shows a significant negative correlation with the construct of terminology and system information (V2), indicating that the more satisfied with terminology and system information the respondents are, the less satisfied with system capabilities they are.

Taken together, the results show that the respondents are satisfied with the five constructs (V1, V2, V3, V5, and V6) of user interaction with ERPsim Distribution Game. Further, the positive effects of the four constructs (V1, V2, V3, and V5) on the overall reactions (V6) in turn may have a positive effect on the use of the ERPsim game. Of course, we need more studies to explore any associations of the constructs of user interaction satisfaction with the use of the ERPsim game. The results on the construct of system capabilities (V5) may be explained in part by the fact that all ERPsim games run on the same SAP ERP platform, and so, the results are more about the SAP ERP system in general, not the ERPsim game. Also, the results of this study may be applicable to other ERPsim games, as they run on the

same SAP ERP platform. However, since each ERPsim game requires a separate set of knowledge that underlies the respective ERPsim game's business process, e.g., logistics, manufacturing, or retailing, the perceptions of user interaction with each ERPsim game may vary. In this regard, we need further studies to extend this study to other ERPsim games and explore any associations between user interaction satisfaction and the knowledge of underlying business processes of each ERPsim game.

Table 2: Descriptive Statistics of Items of User Interaction Satisfaction

Variables	N	Mean	Std. Dev.
Screen (V1)			
Characters on the computer screen	43	7.2326	1.8366
Organization of information on the screen	43	7.6512	1.3607
Sequence of screens	43	7.6279	1.3977
Terminology and system information (V2)			
Use of terms throughout system	42	7.5000	1.2926
Terminology is related to the task you are doing	42	7.4524	1.6410
Position of messages on screen	42	7.6905	1.2971
Messages on screen which prompt user for input	42	7.4762	1.8772
System keeps you informed about what it is doing	42	7.5000	1.5656
Error messages	42	7.2143	1.7042
Learning (V3)			
Learning to operate the system	42	7.0952	1.8187
Exploring features by trial and error	42	6.9762	1.6303
Remembering names and use of commands	41	7.2927	1.5041
Tasks can be performed in a straight-forward manner	42	7.2857	1.4863
Help messages on the screen	42	7.4286	1.6985
Supplemental reference materials (such as Job Aid)	42	7.5476	1.2917
System capabilities (V4)			
System speed	41	5.6585	2.8072
System reliability	41	6.6098	2.1665
System tends to be: noisy to quiet	41	7.3415	1.6675
Correcting mistakes	41	6.7073	2.0279
Experienced and inexperienced users' needs are taken into consideration	41	7.1951	1.7062
Usability and user interface (V5)			
Use of colors and sounds	42	7.5238	1.4183
System feedback	42	7.5238	1.4690
System response to errors	42	7.1905	1.7424
System messages and reports	42	7.6905	1.4054
System clutter and user interface "noise"	42	7.7381	1.2309
Overall reactions to the ERPsim system (V6)			
Terrible to wonderful	42	7.8571	1.4068
Difficult to easy	42	6.6190	1.8206
Frustrating to satisfying	42	7.5000	1.2736
Dull to stimulating	42	7.7619	1.1647
Rigid to flexible	43	7.6744	1.3579

CONCLUSIONS

This study attempted to evaluate user interaction satisfaction with the ERPsim game used as an instructional and learning tool. Our results indicate that the respondents are satisfied with user interaction with the ERPsim game. Our results also indicate that the constructs of screen factors, terminology, and system information, learning factors, and usability and user interface are significant predictors for the construct of overall reactions to the ERPsim game. On the part of developers of the ERPsim game or similar computer simulation games used for instructional and learning tools, enhancing the screen factors, terminology and system information, learning factors, and usability and user interface can help improve the overall user reactions to the ERPsim game. Also, on the part of users of the ERPsim

game or similar computer simulation games for instructional and learning tools, understanding user interaction of the games could help them prepare with reasonable expectation of the games and improve their instructional and learning experiences with the games.

Table 3: Factor Analyses of Study Constructs

Variables	
Screen (V1)	
Characters on the computer screen	0.7401
Organization of information on the screen	0.9172
Sequence of screens	0.9330
Terminology and system information (V2)	
Use of terms throughout system	0.7874
Terminology is related to the task you are doing	0.8053
Position of messages on screen	0.8723
Messages on screen which prompt user for input	0.9176
System keeps you informed about what it is doing	0.8780
Error messages	0.7757
Learning (V3)	
Learning to operate the system	0.8243
Exploring features by trial and error	0.9024
Remembering names and use of commands	0.8727
Tasks can be performed in a straight-forward manner	0.8378
Help messages on the screen	0.7273
Supplemental reference materials (such as Job Aid)	0.8810
System capabilities (V4)	
System speed	0.9233
System reliability	0.9164
System tends to be: noisy to quiet	0.8447
Correcting mistakes	0.9026
Experienced and inexperienced users' needs are taken into consideration	0.8623
Usability and user interface (V5)	
Use of colors and sounds	0.8259
System feedback	0.8901
System response to errors	0.9163
System messages and reports	0.9013
System clutter and user interface "noise"	0.8511
Overall reactions to the ERPsim system (V6)	
Terrible to wonderful	0.7653
Difficult to easy	0.7667
Frustrating to satisfying	0.9223
Dull to stimulating	0.9123
Rigid to flexible	0.9038

A few limitations are recognized in this study. First, the results of this study may be attenuated because of the small sample size and inherent problems related to perceptual studies. We plan to collect more data from students who use ERPsim games in the class. Second, we considered only six constructs of QUIS about user interaction with the ERPsim game. We may need to develop more comprehensive and capable instruments with a high validity and reliability to capture and operationalize the factors associated with user interaction with ERPsim games and further SAP ERP system. Third, we examined only the perceptions of a group of graduate students in a classroom setting. It would be more desirable to examine the perceptions of other users of ERPsim games for more balanced and generalizable findings. Fourth, we used the data from students who used only one ERPsim game (i.e., Distribution Game) in the class. We plan to extend this study to other ERPsim games to examine the applicability of the results of this study. These limitations are certainly not exhaustive, but important ones. Obviously, these limitations suggest several possibilities for future studies.

Table 4: Summary of Regression Analyses

Variables	Dependent variable: V6		
	Beta	t	Significance
Model 1			
V1	0.766	7.534	0.000
Model 2			
V2	0.732	6.706	0.000
Model 3			
V3	0.793	8.018	0.000
Model 4			
V4	0.132	0.822	0.416
Model 5			
V5	0.794	8.151	0.000

Table 5: Inter-Correlations among Six Variables

Variables	V1	V2	V3	V4	V5	V6
V1		0.745**	0.651**	0.065	0.777**	0.766**
V2	0.745**		0.755**	-0.356*	0.840**	0.732**
V3	0.651**	0.755**		-0.129	0.786**	0.793**
V4	0.065	-0.356*	-0.129		-0.188	0.132
V5	0.777**	0.840**	0.786**	-0.188		0.794**
V6	0.766**	0.732**	0.793**	0.132	0.794**	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

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Sung J. Shim, Ph.D., is an associate professor of computing and decision sciences at Seton Hall University – New Jersey, USA. His research interests include information technology implementation, business process reengineering, and computer simulation.

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Using Role Play to Help Students Learn About the Biopharmaceutical Industry in a Strategy Course

Kevin Pan, Samford University, Alabama, USA
Reginald J. Harris, Samford University, Alabama, USA
Quyen Ly, Samford University, Alabama, USA

ABSTRACT

The biopharmaceutical industry is a critical part of healthcare. To develop a biopharmaceutical product, a company must undergo a lengthy, expensive process. Various stakeholders, such as patients and medical practitioners, are involved in decision-making. As a result, biopharma provides ample examples for business students to learn business strategy concepts, such as stakeholder theory and merger and acquisition strategy. However, the complexity and many stakeholders involved can make it difficult for students to grasp strategic issues in biopharma. To help business students understand strategic lessons in the context of biopharmaceuticals, in this paper, we introduce the use of role-play as a class activity to teach biopharma in strategy courses. Students have found role play to be an effective way to help them gain an understanding of strategic issues in the biopharmaceutical industry.

Keywords: role play, class activity, business strategy, biopharmaceutical industry, active learning

INTRODUCTION

The healthcare industry is one of the most important industries. According to the United States Centers for Medicare and Medicaid Services, the national health expenditure in 2021 was $4.3 trillion. This represents 18.3% of the nation's Gross Domestic Product (CMS, 2023). Within the healthcare industry, "the pharmaceutical and biopharmaceutical industry sector is comprised of companies engaged in researching, developing, manufacturing, and distributing drugs. Drugs are products intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease (ITA, n.d.)." In this paper, for simplicity, we refer to the pharmaceutical and biopharmaceutical industry as "biopharmaceutical industry" or "biopharma."

While biopharma is an important industry, it takes a long and laborious process to bring a biopharmaceutical product from the research laboratory to the market. In the United States, only after the FDA (Food and Drug Administration approval can a firm begin to market a drug for sale; Wouters et al. (2020) estimated that the median research and development cost for a biopharmaceutical product was $1.1 billion. These researchers also estimated that it took an average of 8.3 years from the initial submission of the first study to FDA approval (Wouters et al., 2020). It takes a large investment of both finances and time because a drug must go through multiple phases of clinical trials to be considered for FDA approval.

With a lengthy and complex product development process, biopharma must carefully consider business strategy. Meanwhile, since the development process is regulated by the FDA, a government agency, much of the information is publicly available. Therefore, studying business strategy in real-life biopharma events can help business students understand important strategic concepts that can be applied to other industries where the process may be less regulated and, therefore, less transparent.

One important concept in business strategy is stakeholder theory. This theory argues that organizations should be managed to satisfy the interests of all groups with a stake in it, and the shareholders are just one of these many groups (Freeman & Reed, 1983). In biopharma, when the FDA reviews a product application, it has to consider the perspectives of various stakeholders, such as patients, medical practitioners, scientists, and companies. To do so, the FDA can call on public advisory committees, which consist of public members, to review a company's application for drug approval (FDA, n.d.). These public members represent various stakeholders: academicians/practitioners, consumers, and biopharmaceutical companies. These different parties have different interests and perspectives. The FDA advisory meetings hold public meetings where the applicant company and the FDA state their cases, public members make speeches, and committee members have deliberate discussions. The FDA then makes a decision by considering all these stakeholders' points of view.

Another important topic in business strategy is merger and acquisition (M&A) strategy. In a merger, two firms combine to form a new legal entity, and in an acquisition, one firm takes control of another by gaining more than 50% equity ownership (Piesse, Lee, Lin, & Kuo, 2022). M&A strategy is crucial in biopharma for multiple reasons. First, while the exclusive right to manufacture and sell a drug is protected by patents, drug patents generally expire in 20 years (FDA, 2020). Since a company cannot start selling a drug until is approved by the FDA, which can often take more than 8 years (Wouters et al., 2020), the company may have less than 12 years to sell the drug and recoup its financial investment on research and development before that exclusively ends. After patent expiration, other companies can make products of similar formulations, known as generics. Once generic drug alternatives reach the market, the sales of the original drug can decrease significantly for the company that initially developed the drug (DeRuiter & Holston, 2012). Therefore, a biopharmaceutical company face a "patent cliff" when its best-selling products' patents expire, and a coping strategy is to merge with or acquire other biopharmaceutical companies (DeRuiter & Holston, 2012). Further, since a company cannot sell a product until FDA approval, which could take more than 8 years (Wouters et al., 2020), a successful exit strategy for start-up biopharmaceutical companies is to be acquired by a larger company (Pavlou, 2003).

While biopharma is a rich context for exploring strategic topics, the complexity of decision making can be a challenge for students to grasp. The large number of stakeholders involved means that decisions are affected by concerns at multiple levels and many dimensions. Unless students have already studied this industry or worked within it, it can be difficult to grasp how strategic decisions are made. This presents a problem for instructors, "How can we teach students to think about decision-making in the complex context of the biopharmaceutical industry?"

Role play has been used in business education for teaching negotiation strategy (Carrell & Taylor, 2021), persuasion (Costigan & Brink, 2022), and management concepts (Kowalski & Swanson, 2021). In this paper, we describe the use of role play to teach lessons on business strategy in the context of biopharmaceutical industry. The rest of the paper is organized as follows: role play in the literature, role play activity examples for biopharmaceutical industry, steps on how to successfully conduct a role play using biopharma examples, student feedback, and conclusion.

ROLE PLAY IN THE BUSINESS EDUCATION LITERATURE

Role play has been described in business education literature. For example, role play has been used for teaching sales. Rodriguez and Boyer (2018) used role play to help students learn cultural differences to become global sales leaders; role play exercises teach students to develop skills to work with different cultures.

Carrell and Taylor (2021) offered a role-play exercise where students learn strategies for making count-offers in negotiations; specifically, the exercise teaches students "declining increments of concessions" in negotiations. Costigan and Brink (2022) described the use of role play to help students apply Jujutsu persuasion to see the other person's values and frame arguments accordingly in oral persuasion.

Kowalski and Swanson (2021) provided a role-play project where students act as consultants to help a company manage the virtual workspace. The role play project as consultants and managers helps students learn managerial issues related to the virtual workspace.

A related teaching technique is The Time Machine, which has been used to teach management theory (Kowalski, 2022); in the Time Machine method, the instructor asks students to play roles in the past, such as "You are a manager of a textile factory in the 1930s..."

These papers in the literature have shown the utility of role play to help students understand different parties' perspectives. In the following, we will describe the application of role play in teaching business strategy lessons in the context of biopharmaceutical industry, where students need to consider the perspectives of different stakeholders.

EXAMPLE ROLE PLAY ACTIVITIES FOR TEACHING BUSINESS STRATEGY IN BIOPHARMA

Stakeholder theory

Scenario

In 2023, the FDA had to decide whether to approve a novel treatment for Duchenne muscular dystrophy (DMD) developed by Sarepta Therapeutics (Bayer, 2023). DMD was a genetic disease with no cure. The degenerative disease would get worse progressively; a patient would often get diagnosed around age 5, lose the ability to walk by age 12, and die by early twenties (FDA, 2023). Sarepta Therapeutics has a novel gene therapy that in theory could provide a revolutionary treatment for this debilitating disease.

Strategic Considerations
With multiple stakeholders involved, this role play exercise helps students apply stakeholder theory. The stakeholders involved are patients and their families, scientists, medical practitioners, and industry. The FDA had to consider the perspectives of multiple stakeholders when deciding to approve a product by weighing the benefits and risks of a product.

Role-Play Exercise
The instructor can divide students into several roles, and assign each student to play a specific role. For example, "You are Dr. Alexander, a scientist at the FDA advisory meeting, and you need to make a 5-minute talk about your assessment of the drug application." The specific roles:

Scientist representatives: students in this role provide a review of the studies done by Sarepta Therapeutics.

Patient/caregiver representatives: students in this role speak on living with this disease and the need for treatment.

Sarepta Therapeutics representatives: students in this role make a professional presentation on why the drug should be approved by the FDA.

Medical community representatives: students in this role explain the implications of approving or not approving this drug to the medical community.

Industry representatives: students in this role explain the implications of approving or not approving this drug to the biopharmaceutical industry.

The FDA: students in the audience listen to all these stakeholders, and then discuss how to make a decision.

Learning Outcome Assessment
The instructor should explain to the students that grading is not based on whether the student's answer matches what the FDA did but based on logical and detailed consideration of stakeholders' perspectives.

Merger and acquisition strategy

Scenario
In 2022, Pfizer was facing multiple upcoming challenges. Some of its best-selling products were approaching the patent cliff, and the projected decline of COVID-19 vaccine sales in the next few years (Budwell, 2022). To overcome the declining revenues, Pfizer wanted to explore M&A as a strategy to maintain and grow its revenue streams.

Strategic Considerations
There were many potential acquisition targets for Pfizer. The company needed to carefully consider the pros and cons of pursuing different targets. Pfizer needed to evaluate how likely an acquired company's product can successfully receive FDA approval. Pfizer also needed to consider synergy in a deal: how well the acquired companies would integrate with, complement, or conflict with Pfizer's existing product divisions.

Role-Play Exercise
The instructor can divide students into several roles, and assign each student to play a specific role. For example, "you are Mr. Epstein, CEO of Seagen, and you need to make a 5-minute presentation to Pfizer on why it should acquire Seagen, and how much you think Seagen is worth." The specific roles:

Acquisition target representatives: students can be representatives for Pfizer's acquisition targets, such as Arena Pharmaceuticals, Biohaven Pharmaceuticals, or Seagen Inc. (Hopkins, 2023). Each student can make a case of why Pfizer should acquire this company.

Pfizer: students in the audience listen to each target company's presentation. It would be helpful for the instructor to give students a list of discussion questions to be answered. This will be helpful for students in the audience to get the most out of the role play. It is up to the audience member to determine how realistic the target company's statements are. Students can then discuss whether to acquire each company, and the price Pfizer is willing to pay for each company.

Learning Outcome Assessment
The instructor should explain to the students that grading is not based on whether the student's answer matches what Pfizer did but on the quality and logic of the decision. For example, considerations that affect key stakeholder interests

such as the impact on share prices, availability of medicines, prices of drugs, and increased efficiencies will facilitate greater innovation.

STEPS ON HOW TO PREPARE FOR ROLE PLAY

Step 1

The instructor will find websites with background information for each student's role. For the Stakeholder theory activity, the instructor can find websites on the medical condition of interest, whether it is DMD or any condition that will help the students fulfill the patient/caregiver representative role. Given that there are many non-profit foundations devoted to various medical conditions and have created detailed websites, this step should not take more than one hour. For example, the Muscular Dystrophy Association provides information to educate the public about DMD (MDA, n.d.). Additionally, FDA advisory committee webpages, such as that of the advisory committee for Sarepta's DMD treatment (FDA, 2023), have information about the medical condition, drug of question, and patient testimonies. For the merger and acquisition example, the instructor can find each company's website. Further, since many of these companies are public, their 10-K forms, i.e., annual reports, are kept on file with the United States Securities and Exchange Commission for the public to review (SEC, n.d.).

Step 2

Using the websites found in Step 1, the instructor guides students to research their roles prior to role play. For the DMD example from the stakeholder theory role play, the instructor can point students to Brock Dahlke's story on the Muscular Dystrophy Association website (Bowman, 2024) as an example of the life of a patient with DMD, who has a thriving life even without a cure. On the other hand, receiving treatment drastically improved some patients' lives, as exemplified by the testimony of the Flessners', whose sons Mason and Dawson were diagnosed with DMD (FDA, 2023). Their testimony was publicly presented to the FDA advisory committee, and the video and transcripts can be found on the FDA website (FDA, 2023). The instructor can direct the students playing the roles of patients and families to the videos and transcripts to help them prepare for their role play. In the video, their story begins at the 3 hour and 36-minute mark and continues for three minutes. In the role play, the students can use some of the pictures or videos from the Flessners to support their points. Likewise, the instructor can direct the students playing the role of scientists to the part of the video where the scientists were speaking.

For the merger and acquisition role play, instructors can direct students to research a pharmaceutical company that is a prospective target for Pfizer using the 10-K forms found in Step 1. The students can find information about the commercialized drugs in each firm's portfolio as well as each firm's drug pipeline within the 10-K, in Item 1 of Part I, for the fiscal year that is most recent relative to the decision year of 2022. Students will develop a sales pitch from this information to market their firm to Pfizer as a potential acquisition. The student(s) representing Pfizer will need to evaluate each sales pitch and pick the firm whose drug pipeline offers the greatest complement to Pfizer's own existing drug pipeline.

For example, Biohaven Pharmaceuticals' 2022 10-K covers the fiscal year ending December 31, 2021. On page 1 of Item 1 within Part I, Biohaven highlights the FDA-approved drug therapy NURTEC ODT (Rimegepant) (Biohaven, 2022). Two pages later, the company lays out the entire drug pipeline, including drugs in various stages of clinical trials and those that have completed trials and reached commercialization.

STEPS ON HOW TO CONDUCT ROLE PLAY ACTIVITIES FOR BIOPHARMA

In the following we discuss the steps using the role play activity regarding stakeholder theory, though the same steps can be applied to other role-play scenarios.

Step 1

Discuss the context of the role play prior to acting it out. It may be useful to do this within one or two class sessions prior to the role play performance. The idea of role play may be new to students. So, in addition to discussing the theories that the role play will illustrate, it is important to explain the organizations and people involved and the strategic decision that needs to be made. Describe the impact of this decision on the organization and on its stakeholders. Distribute a brief document that explains the real-life context of the role play and the theories illustrated by it. This is a lesson learned the hard way. Students can get lost if they only hear an instructor lecture on theories and examples. So, this document will help students to focus their attention. Finally, this document serves as a reminder in case a student forgets what was said.

Step 2
Solicit volunteers. We recommend that instructors enlist student volunteers for role play at least one class session prior to the class role play performance. While an open-ended role play can provide students more freedom, a scripted role play offers the security of a page to look at which can embolden some students to volunteer who otherwise might refrain. Extra credit is also a useful lure for students who might otherwise refrain from the spotlight, but many students will just be excited to do something new and interesting. Give volunteers their parts and practice the role play, if possible. If not possible, instruct volunteers to familiarize themselves with their roles prior to the class session of the role play. More adventurous volunteers may exercise creative interpretation of their scripted roles, perhaps even, including some improvisation.

Step 3
Set up the classroom. For in-person teaching, one important aspect of successful role play is the physical set-up of the classroom for role play. For example, the classroom that we used was designed for traditional lecture delivery, and all the chairs were lined up to face the lectern in the front of the classroom. This was not ideal for our role play exercise. We changed the classroom setup to encourage students to interact with each other. We combined tables and moved them to the center of the classroom, and we then moved the remaining tables in a semicircle around the center of the classroom. The role players sat at the tables in the center, facing each other. Students in the audience sat at the tables in the semicircle. The instructor could sit at the center of the table or the head of the table to moderate the role play. It is important that the instructor can see the other participants in case one of them needs to be rescued during a misstep in playing their role.

Step 4
Direct students to start role play. As students enter the classroom, the instructor should assign the participants specific seats, as explained above, and hand them the parts corresponding to the roles that they have volunteered to act out. This was the second time they received their parts since the students had received the roles in the previous class session. The instructor should direct the students who did not volunteer for the role play to sit in the chairs in the semicircle.

It is important to prime the audience on how to pay attention to the role play and reflect on how the role players represented various stakeholder interests. The audience should have a list of the roles that are being played and a set of discussion questions to help them to be attentive in a productive way as the role play progresses.

Step 5
After the role play has ended, students can take some time to reflect on the interaction pattern. The instructor should prompt students to answer questions relating to the quality of the discussion, such as how disagreement was handled, whether diverse viewpoints were encouraged or restricted and whether conflict arose from efforts to increase the quality of the decision or from grievance-focused concerns.

STUDENT FEEDBACK

We tested the role-play activity in two business strategy classes. Both classes were taken by undergraduate senior business students. Students had generally positive interactions with the role play. However, some students who participated wished they had the perspective of an audience member. It seems that students who were acting in their roles were less focused when their role was not engaged in the discussion. Students suggested that in the future, quizzes be given to make sure everyone reads the context document carefully before acting out the role play to make the discussion easier to follow. Some student comments:

- "The role play was a unique experience; it made the class more interesting and engaging for me as a student. Typically, public speaking is not my favorite aspect of business classes, but the scripted and minimal speaking part was a nice balance for me."
- "Although I originally did not want to participate in the role play, I found that I really enjoyed it. I would gladly take on a larger role in the future. I found that it was much more engaging than simply reading. I think it was also easier to see the role of human interaction and emotion, which can be absent from the written material. Going forward, I would recommend more role plays."
- "I enjoyed my role a lot, and I liked having a larger portion. For me talking in class is something I am used to, as I'm sure you are aware, mostly in part because it allows me to be more engaged and learn more. As I

talk a lot it allowed me to be comfortable in my role as everyone has already heard me talk a lot already or watched me write on the board. Overall, this was a very interesting and different classroom discussion, but I felt was very effective for this case and was just fun to mix it up."

- "I enjoyed playing my part in the role play because I believe that hands on learning is the best form of learning."
- "I enjoyed playing my role because my character was not one of the main ones causing conflict. He only spoke briefly but provided valuable insight into the meeting."

CONCLUSION

Role play is an engaging and interactive method to bring concepts and theories to life. In this paper, we describe how role play can be used to help students learn strategic concepts in the context of the biopharmaceutical industry. While biopharma is an important industry, the numerous stakeholders' interests involved and the complexity of the issues present in every decision can make it difficult for students to identify and learn the strategic issues. Role play provides a solution to this problem by allowing students to take on different roles in a decision-making scenario.

Part of the power of role play as a teaching tool is that it can be based on real decision makers making real-life decisions. To this end, biopharma provides a rich source of public information because it is a federally regulated industry, a product can be marketed only after undergoing an extensive FDA approval process. The FDA, as a government agency, holds public meetings and publishes information for the public to review. As a result, faculty and students can have access to documentation, including issues raised by stakeholder groups present at these meetings. We provided two example role-play exercises, one for teaching stakeholder theory and the other for teaching M&A strategy. We also offered steps on how to successfully use these role-play activities.

We tested the role play in two undergraduate business strategy courses. Student responses were very positive from both participants and audience members regarding the role play. Students were able to identify the perspectives of different players involved in decision-making.

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Kevin Pan, Ph.D., is an associate professor of quantitative analysis at the Brock School of Business at Samford University. He received a Bachelor of Science in Electrical Engineering from National Taiwan University, a Master of Science in Electrical Engineering and a Ph.D. in Biomedical Informatics from Stanford University.

Reginald J. Harris, Ph.D., is an assistant professor of management at the Brock School of Business at Samford University. He received a Bachelor of Science in Mathematics from the University of Houston, a Master of Business Administration from Augusta University, and a Ph.D. in Strategy from Florida State University.

Quyen Ly, PharmD., is a clinical staff pharmacist at Unity Health Clinic. He received a Bachelor of Science in Pharmaceutical Science, a Master of Business Administration and a Doctor of Pharmacy from Samford University.

Teaching Business Model Analysis With The Wall Street Journal

Rebecca Bunkley Schmeller, Ashland University, Ashland, Ohio, United States of America

ABSTRACT

Purpose. This paper's findings, originally presented at the 2022 Association for Business Simulation and Experiential Learning, addresses the reported lack of Business Model understanding by examining Wall Street Journal articles for teaching Business Model concepts in a capstone business course. **Findings**. Content analysis of a random convenience sample of articles found 63% were appropriate for illustrating Business Model analysis. **Recommendations**. This limited study should be expanded with larger samples. **Limitations**. This study used randomly chosen samples of teaching materials and news articles, and this study's content analysis used interpretive coding. Future research with automatic coding is needed to increase validity. **Value**. Because evidence shows a lack of Business Model understanding in undergraduate business students, professors must use innovative and experiential methods.

Keywords: business capstone course, business model teaching, business news

INTRODUCTION

The business capstone course

"To finish the learning process effectively, meaningful and valuable culmination of experiences in the final year of the curriculum is often achieved in a required capstone course" (Alstete, Beutell, 2016, p. 174). Alstete & Beutell (2016) also called for more research about capstone pedagogy. They stated, "It is our contention that all schools carefully examine capstone courses in light of instructional techniques and delivery formats" (p. 173). To answer that call, this paper adds to the domain of studies about business news in teaching of Business Model analysis and the AACSB standards of "engage, innovate, impact" (Miles et al, 2014).

How does Business Model theory relate to the capstone course?

As venture capitalists embrace Business Model Canvas and other Business Model Analysis (Mullins et al, 2009), the topic is growing in importance and inclusion in business school curricula (Massa et al, 2017). The literature about Business Models is growing as investors apply the concept's use and professors seek effective ways to teach it (Kling et al, 2011; Darnell, Jacobs, 2019). There are numerous studies about Business Model taxonomy provided by HBR.org and BusinessModelCommunity.com), but these explorations do not address students' lack of simple and applicable understanding about the model (Foss & Saebi, 2017).

We apply Napier's (2017) method of content analyzing Wall Street Journal news. Napier's (2017) study rated news as negative or positive then correlated those poles with bear or bull market timing for four market bottoms between 1921-1982. This paper's similar approach was to tally reports of Business Model elements.

What is Business Model theory?

At its core, the theory includes classifying business elements into two broad categories: Value Proposition (product or service) and Profit Formula (revenue and costs) (Gamble, Thompson et al., 2021). The literature includes various taxonomies of these components (Mullins et al., 2009) and reports that a universal student understanding of Business Model components is lacking (Foss, Saebi, 2017). These various taxonomies are wide and deep, stretching from analysis of Drucker's early work "What is a business model?" (HBR.org 2015) to vibrant communities of Business Model scholars (businessmodelcommunity.com). The vast array of scholarship and research on business models aims to categorize and subcategorize the core components of Value Proposition and Profit Formula. It seems simple and obvious, but Foss and Saebi (2017) report a lack of universal understanding.

To address this basic lack of classification skills, business school professors seek better teaching methods (Darnell, Jacobs, 2019). Business schools use business news to teach and to give students analysis practice. But there is a dearth of reported studies about this technique. Specifically, there is no research on the efficacy of using business news articles as case studies for learning exercises about Business Model elements. This paper seeks to fill that literature gap.

A survey of the literature found that research on teaching with business news addressed other, non-Business Model topics: Marketing (Fowler, Bridges, 2017), Mergers and Acquisitions (Bentham, 2018), Learning Styles (Palomo, Figueroa, 2017), Business English Instruction (Zhou, Shang, 2020,) and Strategy Simulations (Schmeller, 2021), but it did not address Business Model teaching. This paper proposes that business news serves as a "live case study", similar to grid-based simulations in that it provides students with "experience that goes beyond the hypothetical" (Karriker & Aaron, 2014, p. 769).

How can content analysis, as a research method, measure business news?
This study's research question is, "Does business news illustrate Business Model concepts?" The literature includes studies of content analysis used to tally and categorize news articles (Perez et al, 2018). Furthermore, reports of coding categories and methods vary widely (Sjovaag & Stavelin, 2012). Using business news which is current, daily, and ever-changing promises to bring the elements of Business Model to life as has been found effective in the research about live case studies (Karriker & Aaron, 2014). Classifying Business Model elements in business news embraces the passive-active learning spectrum researched by Hartikainen, Rintala, and Pylvas (2019).

LIMITATIONS

As a representative of mainstream business news, one randomly chosen day of The Wall Street Journal Business section front page was used. This aligns with research suggesting WSJ news represents the larger population of business news (Napier, 2016). Limitations which should be addressed in future studies are: 1) small sample size and 2) measuring content, not effect.

RESEARCH QUESTION

Does business news illustrate Business Model analysis which can help students practice Business Model taxonomy?

METHODS

Population
This teaching note can be applied to the larger set of business capstone teaching materials and the larger set of business news.

Sample
A sample of teaching materials (Gamble, Thompson & Peteraf, 2021) were used as a representative of the many available. A sample of business news (Wall Street Journal, Oct. 14, 2021) was used (Napier, 2016).

Variables and Scoring Categories
A content analysis (Roller, 2019) coded mentions of Value Proposition (product or service) and Profit Formula (revenue and costs) as per Gamble et al (2021). A score was generated for each article (An & Gower, 2009). The rubric used one point per inclusion of one Business Model Element (Value Proposition, Revenue, Cost) and partial points per indirect mention; therefore, the maximum score was 3.

On October 14, 2021, eight articles were headlined on Page B1, the first page of the Business and Finance section B. The random sample of WSJ.com business news articles are shown in Table 2.

RESULTS

Content analysis revealed that current business news, as evidenced by Wall Street Journal Business and Finance, October 14, 2021 (see Table) does illustrate Business Model elements. What follows is a brief classification of each article's elements.

Table 1
Tabulation of Content Analysis

Article title	Summary	Value Proposition	Profit Formula	Score
Fuel costs temper Delta's outlook Alison Sider	Rising oil prices could detract from revenue increases caused by increased business bookings.	Business class bookings as a product type (versus leisure bookings)	Revenue from business bookings. Costs from rising oil prices	3
Actively managed funds bolster BlackRock Dawn Lim	Profits rose 23% because actively managed funds (used to mitigate index fund swings) have higher fees (than index funds) and were embraced by investors to cope with volatile stock market.	Actively managed funds as product type (versus passive Index funds)	Share of revenue from each fund class Lower costs of index funds translate to lower fees CEO quote about investing in actively managed funds personnel and processes	3
Apple examines AirPods as a hearing aid Rolfe Winkler	Apple studying ways to make AirPods and Watch into health devices, offering enhanced hearing, body temperature reads and posture monitoring.	Apple's product scope [increasing presence in health products]	AirPods generated $12.9 b revenue in 2020. No mention of share of total revenue or costs.	1.5
Facebook tightens employee access Deepa Seetharaman	Tightening controls over some internal discussion groups (as result of whistleblower problems)	Internal discussion groups are important for employees who manage products of platform safety and election interference	Revenue mentioned as potentially lowering from stricter product offerings (revenue from billions of user ad targeting sold to advertisers). Costs mentioned indirectly as operating costs for: internal messaging, AI and human content moderation	3
Shatner flies final frontier via Bezos lead Micah Maidenberg	Blue Origin, Bezos' company, flew civilians to establish new space-tourism market.	Human space flight by commercial enterprises like Blue Origin, Virgin Atlantic, SpaceX contributing to new industry of space commerce.	Blue Origin has generated $100 million in sales. Revenue for ancillary industries is also mentioned: fuel for satellites, capture and sell data about earth, helping to launch rockets (vehicles, services). These also serve as costs for space flight companies.	3
Inflation fears narrow treasury yield gap Sebastian Pellejero	Gap between ST and LT Treasury bonds narrowed after inflation rose, fueled by investors' bets that Fed will raise rates	News does not apply to company product, but indirectly to financing (acquiring cash for operations – see cost in next column)	If inflation rises, general prices and revenues could rise also. If rates rise, the cost of capital will rise – affecting financing for all companies.	1
Alitalia, the airline that once symbolized Italy's jet set, is set to make its last flight Eric Sylvers	Alitalia, in bankruptcy protection since 2017, will transfer some assets (planes, airport slots, employees) to Italia Trasporto, a new airline owned by Italian government.	Formed after WWI with US-Europe flight increases and Rome's "sweet life" and illustrious flyers (actress Sophia Loren, Pope Francis).	Revenues decreased when the airline failed to adapt to deregulation, consolidation, low-cost carriers, faster trains, strikes. Costs mentioned indirectly as government bailouts and investments of $11.6 b since 2008.	3
Digital-coin exchange Binance will disallow trading involving China's yuan Elaine Yu	Binance, the world's largest cryptocurrency exchange, founded 2017 and initially based in China, will not accept purchases using the yuan.	Ability to buy and sell currency (similar to other financial exchanges for stocks, bonds, commodities).	Bitcoin's value ~$5,700, up 31% per month and 97% per year directly affects revenues for Binance (and Huobi the other exchange mentioned) because revenues are fee and commission based.	1

DISCUSSION

Implications and Recommendations for Practice

The content analysis scores show that current articles do report live examples of basic business model concepts 63% of the time. To bring this to the classroom, the following teaching methods are suggested (Schmeller 2020).

- Headline surveying. Assign students to read and analyze various headlines or articles from the current business news -- delivering an in-class presentation or an online post about how the news corresponds to Business Model elements (value proposition, profit formula). This technique can be used at a brief level or at a deep analytical level -- assigning students a quick 5-minute analysis time or an extended one-week project due date.
- Public company research. Have students choose one publicly traded company to follow throughout the semester. Each week, students submit findings (class presentations or online posts) about how the followed-company's news reflected precise changes to the company's Value Proposition or Profit Formula (product, revenue, or costs).

Recommendations for Future Research

Future studies should measure this teaching technique's effects on student learning. Some possible future research questions are: 1) Using one control group (no business news analysis in class) and one test group (business news analysis in class), how does student learning compare? 2) Using the same control groups, how do capstone analysis tools like Balanced Scorecard, Strengths Assessment, Strategic Group Map, Five Forces, Macro Environment (Gamble et al 2021) affect the test group? Limitations that should be addressed in future studies are convenience sample and sample size of teaching materials and business news.

CONCLUSION

Current business news articles are an acceptable way to teach Business Model concepts because, according to this content analysis, they demonstrate critical aspects of Business Model elements (Value Proposition, Profit Formula). More research in this domain should be conducted using larger samples of teaching materials and larger samples of business news.

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Comparing Instructor and Student Perspectives of Online versus Face-to-Face Education Individual Factors During the Pandemic

Lynn Fish, Ph.D. and Coral Snodgrass, Ph.D., Canisius University, NY, USA

ABSTRACT

During the pandemic, business students' and instructors' perspectives regarding face-to-face and online were simultaneously surveyed. Instructors and students who have experienced online education, significantly differ on their perspectives of online education with respect to individual factors of motivation, self-directed, independence, schedule flexibility, time investment, and overall preference for FTF. However, the two groups did not significantly differ on their perspectives for discipline, cost investment, happiness with the environment, and online appropriateness. The AACSB-accredited, Jesuit, Catholic University has a strong focus on face-to-face teaching. This article offers insight into the differences in educational environment perspectives, which may affect student learning.

Keywords: Online Education, Individual Perspectives, Instructors, Students

INTRODUCTION

Instructor and student perspectives of various educational methodologies have been researched. Most studies focus on students or instructors. This study is unique as it analyzes the perceptual differences between instructors *and* business students at the *same* University at the *same* time, one-full year into the pandemic. We are unaware of any similar studies that compare two groups' perspectives of online versus face-to-face (FTF) education simultaneously.

Prior to the pandemic, while face-to-face (FTF) education was the primary educational method at the University of study; however, a few online courses and programs were offered. The factors instructors and students viewed as important to the online versus FTF discussion were developed in the original research by scientifically analyzing the literature in this area (Fish & Snodgrass, 2014). The study's authors had been separately researching business students' (Fish & Snodgrass, 2014, 2015, 2020) and instructors' (Fish & Snodgrass, 2018) perspectives of FTF and online education since 2012. Despite technology improvements, prior results demonstrated a strong preference by instructors and students at the University for the traditional FTF education for almost all factors studied. The factors were divided into individual and program factors. Individual factors are specific to the individual (instructor or student) and include motivation, discipline, self-directed learning and independence, schedule flexibility, time and cost investment, preference, happiness and appropriateness for learning environment. Program factors, which are decisions that the instructor makes in developing the course, include academic difficulty, academic integrity (cheating), student-to-student interaction, student-to-instructor interaction, and program technologies. (Readers interested in a deeper literature review on the individual and program factors should consult Fish & Snodgrass (2014, 2015).) With respect to program factors, instructors and students significantly differ on their perspective of difficulty, but not on the other program factors of student-to-student interaction, student-to-instructor interaction and cheating (Fish & Snodgrass, 2023). This article focuses on the student and instructor perspective of individual factor differences between online and FTF.

Despite technology improvements, prior to the pandemic, results demonstrated a strong preference by students and instructors for the traditional FTF education on most factors studied. As student online experiences increased, students' perspectives of equivalences were positively related (Dobbs, Waid, & del Carmen, 2009; Fish & Snodgrass, 2014; Platt, Amber & Yu., 2014). The pandemic caused a radical change in educational delivery as FTF classes moved online. Following the pandemic, higher education will look very different than prior to the pandemic. Today, most instructors and students have experienced online education. Did this impact upon their perspectives? Understanding faculty and students' perspectives and their differences is needed as results may guide future online pedagogy, instructional strategy and technology integration to support online learning (Redman & Perry, 2020). This study offers insight into the differences in perspectives for individual factors between instructors and business students.

Literature Review

Higher education has continued to increase its use of online education, even prior to the pandemic. Senior administrators perceived online education to be equivalent to FTF and concluded that there were no significant

differences between FTF and online learning outcomes (Allen & Seamen, 2016). However, research has shown that instructor and student perspectives of learning and overall satisfaction between FTF and online instruction are not always equivalent. Research indicates that student's perspectives of FTF and online courses are equally effective (Baker & Unni, 2018), others show a higher satisfaction for online over FTF environments (Connolly, MacArther, Stansfield & McLellan, 2007), and yet other studies show a preference to FTF over online environments (e.g., Fish & Snodgrass 2014, 2015, 2018, 2020; Kuzma, Kuzma & Thiewes, 2015; Spencer & Temple, 2021; Tratnik, Urb & Jereb, 2019; Weldy, 2018).

As methods and technology to teach and learn online continue to evolve, research on perspectives of the online versus FTF education continue. With respect to performance and contrasting to senior administrators, an AACSB-accredited business school reported over 65% of students strongly disagreed or disagreed that learning is greater from online courses (Kuzma, Kuzma & Thiewes, 2015). These studies occurred *prior to the pandemic* and most comparisons occurred from the FTF perspective. The pandemic has altered our lives. Therefore, the question before educators is '*what will education 'look like' in the future?* Instructor and student perspectives will shape the answer to this question. Studies into instructor and student perspectives will continue to evolve as technology evolves (Richardson, Besser, Koehler, Lim & Strait, 2016). This literature review is intended to highlight more recent research on instructor and student perspectives on individual factors and is not intended to be a comprehensive review.

Faculty are responsible to create an environment that provides students with an engaging, motivating and successful learning experience, and therefore, understanding their perspectives is important to improving instructional effectiveness. FTF and Online course design are very different. Instructor perspectives regarding online education will impact upon technology use and instructional pedagogy (Redman & Perry, 2020). In online course development, the instructor's role changes from direction and control toward student-centered constructivist pedagogy supported through technology, compatible instructional strategies and assessment that promote self-directed learning (Broadbent & Poon, 2015; Esterhuizen , Blignaut & Ellis 2013). Instructors are influenced by personal preferences, faculty resources (pedagogical training, time and compensations), more effective technology, and infrastructure (Shreaves, Ching, Uribe-Florez & Trespalacios, 2020). In general, instructors resist (Mitchell, Parlamis & Claiborne, 2015) and are skeptical of online education (Allen & Seamen, 2016). As some instructors feel online education is contrary to their teaching values, they want online courses to be carefully regulated (Shreaves et al., 2020). Faculty perspectives are shaped by student engagement, technology complexity issues, technical skills, loss of control, quality concerns, and an increase in faculty time and workload (Shreaves et al., 2020).

Researchers into student success argue that there is a need to include student perspectives, attitudes and preferences towards instructional format itself (Buchanan & Palmer, 2017). Many student perspective studies were published prior to the pandemic, and some noted changes in perspectives (e.g. Tanner, Noser, & Totaro, 2009; Perreault, Waldman, Alexander & Zhao, 2008). Results on student perspectives vary and most studies report that students do not perceive online and FTF classes to be equivalent (Platt, Amber & Yu, 2014).

Instructors and students bring individual perspectives to the educational environment. The individual factors studied here include motivation, discipline, self-directed, independence, schedule flexibility, time investment and cost investment, their preference for FTF, happiness with online, and online environment appropriateness. Respective to these factors, we continue with a discussion on these factors, our prior results for the online instructors' and students' perspectives, and specific research questions for the online instructors and students.

Motivation. Research on student motivation reveals mixed results as some note increased motivation online (Larson & Sung, 2009), while others note decreased motivation online (Lei & Gupta, 2010). One study noted that online learning was viewed as effective for students that are motivated (Jacob & Radhai, 2016). Instructors felt that online instruction may enhance their FTF teaching, confidence, motivation and attitudes towards online teaching (Borup & Evmenova, 2019). In our prior research, instructors and students indicated a significant difference in their motivation online versus FTF and favored the FTF environment (Fish & Snodgrass, 2014, 2015, 2018 & 2020). Potential perspective changes lead to our research question #1: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on motivation?

Discipline & Self-directed. Online learning can be effective for self-disciplined and organized students (Jacob & Radhai, 2016), and for students who are predisposed to self-directed learning and self-discipline (Tratnik et al., 2019) as online courses requires more self-directed learning (Weldy, 2018). Online students argue that online allows them to plan their time and study effectively as online was more self-directed (Kirtman, 2009). Research on instructor

perspectives indicates that factors that encourage online teaching include personal challenge, unique instructional options, and institutions rewards and recognition (Shreaves et al., 2020). Instructors perceive online courses as offering less control when teaching (Chiasson et al., 2015).

Our prior studies showed that online and FTF instructors' perspectives significantly differed on both discipline and self-directed (Fish & Snodgrass, 2018). Online instructors felt that more discipline was required online than FTF, but they were relatively indifferent to the environment for self-directed. In the past, students did not differ on their perspectives for discipline between the two environments as online students were indifferent (Fish & Snodgrass, 2014, 2015, 2020). These differences lead to research question #2: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on discipline? With respect to self-directed, originally students indicated a significant difference between the two environments (Fish & Snodgrass, 2014, 1015); however, their perspective shifted toward indifference between online and FTF students (Fish & Snodgrass, 2020). This leads to research question #3: Do instructor and business students' perspectives of online versus Face-to-Face education during the pandemic differ on self-directed learning?

Independence. Prior research for instructors and students indicated that individual perspectives between online and FTF education are significantly different for independence; however, instructors were relatively indifferent to the two environments, while students perceived online as offering more independence than FTF (Fish & Snodgrass, 2014, 2015, 2018, 2020). This leads to research question #4: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on independence?

Schedule Flexibility. Schedule flexibility are often noted as a driving factor as to why students (Dobbs, del Carmen & Waid-Lindberg, 2017; Mather & Sarkans, 2018; Nguyen, 2015; Platt et al., 2014) and instructors (Shreaves et al., 2020) choose online classes. Students favor online as they can manage competing priorities and long travel distance (Mather & Sarkans, 2018) through the flexibility provided by online's asynchronous features (Dobbs et al., 2017). Our previous research indicated that instructors and students perceived online and FTF environments differently, and online instructors and students favored online as offering more schedule flexibility studies (Fish & Snodgrass, 2014, 2015, 2018 & 2020). Therefore, we pose research question #5: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on schedule flexibility?

Time investment. Research results on time management perspectives are mixed as some results indicate that online students indicate they spend more time online (Perreault et al, 2008: Dobbs et al., 2009; Lovern & Lovern, 2013), while FTF students perceived that they spend more time (Weldy, 2018). Online education tends to be preferred by students with good time management skills (Jacob & Radhai, 2016; Nguyen, 2015; Tratnik et al., 2019). However, FTF students indicated that they required less time for content clarification than online (Lovern & Lovern, 2013). As for instructors, instructors believe online education requires more instructor time and increases the workload, technology issues, course quality concerns, and fear or resistance to change all discourage online teaching (Shreaves et al., 2020). Instructors perceive online courses require more time to develop (Chiasson et al., 2015). Instructors perceive barriers to online teaching include faculty time, rewards, workload, lack of administrative support, cost, course quality and technology issues (Chang, Shen & Liu, 2014).

Our prior research found instructors perceived the two environments as being significantly different for time investment and felt that they spent more time online (Fish & Snodgrass, 2018). In 2012, students did not perceive a time investment difference between online and FTF; however, by 2018, students perceived a significant difference between online and FTF as online students were indifferent for time management (Fish & Snodgrass, 2014, 2015, 2020). This leads to research question #6: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on time investment?

Cost investment. Research notes the cost-effectiveness to the individual and institutions in offering and taking online courses (Nguyen, 2015). Cost savings may be fueling the demand for online (Nguyen, 2015). However, another study noted that barriers to online teaching includes cost (Chang et al., 2014). Our prior study found that instructors did not see a significant difference with respect to cost investment between the two environment, and online instructors were indifferent to the cost investment (Fish & Snodgrass, 2018). In our prior student studies, students felt there was a significant difference in cost between the two environments, and online students felt online cost less than FTF (Fish & Snodgrass, 2014, 2015, 2020). With this in mind, our research question #7: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on cost investment?

Preference opposite? Student success studies note the need to include student perspectives, attitudes, or preferences towards the instructional format itself (Buchanan & Palmer, 2017). Most students do not perceive online and FTF classes to be equivalent, but students who experienced online classes were more amenable to taking another online course (Dobbs et al., 2009; Mather & Sarkans, 2018; Platt et al., 2014). Several studies noted that students prefer FTF instruction (Pointer, Carden & Smith, 2019; Tratnik et al., 2019). Students believe they learn and retain more information, perform better and prefer FTF classes than online classes which they perceive requires more self-teaching (Weldy, 2018).

Online instruction requires a deeper understanding of course technology, and pedagogical knowledge and skills specific to content and learning goals, while incorporating curricular factors that promote student interaction, metacognitive strategy skill development and subject mastery (Esterhuizen et al., 2013). Instructors' self-perceptions of their technical skills affect their willingness to teach online (Shreaves et al., 2020). Instructors experience teaching online is a significant factor in instructor perceptions as instructors with positive experiences felt that online and FTF yielded equivalent outcomes, while instructors without online or negative experiences felt that outcomes were not the same (Fish & Gill, 2009).

Specific to this article, in our survey the question asked the respondent if they would prefer to be in the 'opposite' (FTF) environment. Our prior research found a significant difference between instructors in their perspectives of online and FTF preferences as online instructors were indifferent (Fish & Snodgrass, 2018). Both student surveys found a significant difference between online and FTF students' perspectives on preference as online students favored being in the FTF environment (Fish & Snodgrass, 2014, 2015, 2020). With this in mind, our research question #8: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on a preference to be in the opposite learning environment?

Happiness with environment. Student happiness and related performance results between the two environments remain 'mixed'. Some studies indicate that student effectiveness is equal across the modalities (Cavanaugh & Jacquemin, 2015; Larson & Sung, 2009), while others show a preference to FTF (Evans, 2015; Flanagan, 2014), and others show a higher satisfaction for online learning (Harmon, Alpert & Lambrinos, 2014). If the instructor appears disengaged, online students may be unhappy with the lack of instructor communication and feedback (Mather & Sarkans, 2018). Factors that encourage instructor to teach online include personal challenge, satisfaction, flexibility, convenience, greater student access, unique instructional options, and institutions rewards and recognition (Shreaves et al., 2020). Our research specifically asked respondents if they were 'happy' with the environmental perspective that they were responding from (online or FTF). Instructors noted a significant difference between the two environments, and online instructors were indifferent to the two environments (Fish & Snodgrass, 2018). Our research found that online and FTF students significantly differed in their happiness with the environment in 2012, but not in 2018 (Fish & Snodgrass, 2014, 2015, 2020). Online students were happier with online education in 2018. This discussion leads to research question #9: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on happiness in the online environment?

Online appropriateness. Prior research indicated that instructors perceived online instruction to be inferior to traditional FTF teaching (Fish & Gill, 2009). Over a decade ago, over two-thirds of faculty believed online learning outcomes were inferior to traditional FTF courses, and 60% of faculty at a four-year institution reported feelings of fear of online related to time commitment, loss of control, failure or comfort-level (Allen, Seaman, Lederman & Jaschik, 2012). Faculty acceptance of online education remained relatively unchanged between 2003 and 2015, with an acceptance rate of only 30%, and by 2015, over 25% still reported that learning outcomes online were inferior to FTF (Allen & Seaman, 2016). Contrastingly, while students preferred FTF, they perceived online courses positively as facilitating prompt feedback and positively viewed their instructor's skill level and technology use (Spencer & Temple, 2021). Our prior research revealed that FTF and online instructors significantly differed on the appropriateness of online education as online instructors viewed online as appropriate (Fish & Snodgrass, 2018). In 2012, FTF and online students view the online appropriateness the same; however, by 2018, they differed (Fish & Snodgrass, 2014, 2015, 2020). Online students shifted from being indifferent towards accepting online. This leads to research question #10: Do instructors and business students' perspectives of online versus Face-to-Face education during the pandemic differ on the online appropriateness education?

While we have been researching instructor and student perspectives on online and FTF education for almost a decade (Fish & Snodgrass, 2014, 2015, 2018, 2020), our literature review did not find any research that compared these populations directly as in this study. This study may represent one of the first to directly compare instructors' and

students' perspectives at the same University at the same time period. Our study focuses on a mid-sized, Jesuit, Catholic business school with an emphasis on teaching. FTF classes average 17 students with a capacity of 35. In 2012, online education was available, but rare at the institution. During the pandemic, most students – but not all – had experienced at least one fully-developed online course. Our purpose here is to uncover the similarities and differences between instructors (who deliver it) and students (who receive it) in their perceptions of online education. Theoretically, and to encourage a positive learning environment, instructors and students should perceive the environments equally. By simultaneously surveying both groups at the same institution, the differences and similarities in perceptions can be uncovered. Where differences exist, it may affect the learning environment. Our research focus in this paper seeks to compare the perspectives of the instructors and students who experienced online education for individual factors.

As noted in our previous research (Fish & Snodgrass, 2014, 2015, 2018, 2020), the context of the study (university size, audience, and research method) may be an important factor to consider in interpretating the results. The results presented here represent one datapoint in a complex situation.

METHOD

As part of a continuing study at an AACSB-accredited, Jesuit Catholic University in the northeast, one year into the pandemic, online Qualtrics-administered surveys were sent to business students and instructors. Through a list server each survey was sent to their respective audience three times during the month of April 2021. The Academic Vice President and University Internal Review Board granted approval for distribution. In 2012, based upon research, the authors designed a survey for business students on the perspectives of FTF versus online learning environments. The survey consisted of 3 major sections: demographic questions, Section A (online course) or Section B (traditional FTF). Student demographic questions included questions on gender, age, class rank (undergraduate – freshmen, sophomore, junior, senior or graduate), undergraduate major or graduate program and potential concentration (graduate), online experience, self-reported level of technological understanding, whether the student was a transfer student, and, if the student took an online course, the number of online courses taken. Instructor demographic questions included questions on age, gender, respective school the instructor associates with, teaching level (undergraduate, graduate, or both), level taught, faculty rank, self-reported technological skill level, online course experience as a student, and online teaching experience. Then the respondents were directed toward Section A or Section B. Students who took or instructors who taught at least one complete online course completed Section A, while students who never took or instructors who never taught a complete semester-long online course completed Section B. Sections A and B had corresponding questions on the perspectives noted. Section A statements had the wording "I found" versus Section B statements with the wording "I perceive". Relevant to this study, individual factors studied include motivation, discipline, self-directed learning, independence, schedule flexibility, time and cost investment, preference, happiness and online appropriateness. The instructor survey can be accessed at: http://dx.doi.org/10.15239/j.brcacadje.2018.07.01.wa02.The student survey was essentially the same as the instructor survey with respect to the statements; however, the student perspective was course 'taken' versus the instructor survey course 'teach'. The student survey can be accessed at: http://dx.doi.org/10.15239/j.brcacadjb.2015.04.01.wa04. For each survey, each factor was rated by the individual using a five-point Likert scale: significantly dislike, dislike, okay, like and significantly like. Section A concluded with an open-ended question inquiring as to why they chose an online course. Section B finished with an open-ended question as to why the individual did not choose an online course.

Business students are required to take 50% of their credit hours in liberal arts, and therefore, business students take courses taught by instructors throughout the University and not just within the business school. Instructors are encouraged to use the University's Learning Management System (Desire2Learn) as well as other software programs in online course delivery as they are responsible for content delivery as online course designers are not available.

RESULTS

The focus of this article, Section A (online survey) included 147 business students and 95 instructors. Participants were not required to answer every question, and therefore, some factors may have fewer responses in the dataset. (Twelve students and twenty-five instructors completed Section B (FTF), which is not this article's focus.)

Online student respondents had an average age of 23.76 (SD = 6.79, with a range of 18-55 years, mode of 20). 82 male and 78 female students participated. 16 freshman, 36 sophomores, 25 juniors, 25 seniors and 59 graduate students

completed the survey. The average instructor age was 54.5 (SD = 12.33, range from 26 to 78, mode of 50), and 45 female and 50 male instructors participated. 37 lecturers/adjunct professors, 10 assistant professors, 15 associative professors, 33 professors and 3 others responded. Instructors have taught at the University for an average of 17.51 years (SD=12.55, range from 1-42 years, mode of 20). Table 1 shows the number of responses for each individual factor for students and instructors.

Table 1. Number of Responses Students & Instructors (2021)

Factor	Students						Instructors					
	1	2	3	4	5	Mean	1	2	3	4	5	Mean
Motivation	35	34	45	21	11	2.58	12	21	50	6	4	2.67
Discipline	4	16	44	43	39	3.66	2	7	34	30	19	3.62
Self-directed	26	24	32	32	32	3.14	22	24	30	9	7	2.51
Independence	13	17	31	46	39	3.55	14	19	24	30	6	2.95
Schedule flexibility	10	6	17	48	65	4.04	6	18	14	39	15	3.42
Time investment	6	18	50	46	26	3.47	1	2	26	39	24	3.90
Cost Investment	8	18	93	17	10	3.02	7	15	56	10	4	2.88
Preference opposite?	65	35	46			1.87	54	19	17			1.59
Happiness with environment	22	20	38	35	32	3.24	13	16	30	19	14	3.05
Appropriateness	81	32	33			1.67	53	19	20			1.64

This study's intent was to compare instructors' and students' perspectives for the individual factors; however, it was important to test whether the populations were indifferent to the two learning environments. Indifference to the two environments was indicated by the respondents with a response of '3' (the scale midpoint) on any factor. As shown in Table 2 (two-tailed t-tests for a hypothesized difference to the midpoint (3)), both populations' perspectives of the two learning environments statistically differed from the midpoint for all individual factors.

Table 2. Two-Tail T-Test Significance from Hypothesized Mean Difference from Midpoint (3) Online versus FTF Education

Factor	Student	Instructor
Motivation	0.000*	0.000 *
Discipline	0.000*	0.000 *
Self-directed	0.000*	0.000 *
Independence	0.000*	0.000 *
Schedule flexibility	0.000*	0.000 *
Time investment	0.000*	0.000 *
Cost Investment	0.000*	0.000 *
Preference opposite?	0.000*	0.000 *
Happiness with environment	0.000*	0.000 *
Appropriateness	0.000*	0.000 *

* $p \leq .05$

Using SPSS, students' and instructors' perspective differences were analyzed through Chi-Square analysis using the contingency coefficient as the nominal value. The individual factors of motivation, self-directed, independence, schedule flexibility, time investment and preference for the opposite (FTF) environment were significantly different between instructors and students as shown in Table 3. While instructors were indifferent on motivation, students were less motivated online. On average, most student responses for self-directed were indifferent, but instructors liked online less than FTF for self-directedness. Students enjoyed independence online more than instructors who were indifferent. Both groups felt online offered more schedule flexibility and time investment than FTF. Students felt online offered more schedule flexibility than instructors, and instructors felt online offered more time investment than students.

Table 3. Chi-Square Analysis based upon Instructor vs Student Online Environment Individual Factors

Metric	Pearson Chi-Square Value	Df	Asymptotic Significance (2-sided)	Pearson's R	Spearman Correlation
Motivation	15.182	4	.004*	-.037	-.052
Discipline	2.562	4	.634	.021	.030
Self-directed	18.000	4	.001*	.226	.224
Independence	17.726	4	.001*	.237	.246
Schedule flexibility	28.697	4	.000*	.251	.288
Time investment	13.025	4	.011*	-.213	-.206
Cost investment	1.752	4	.781	.079	.077
Preference opposite?	6.166	2	.046*	.161	.162
Happiness with environment	3.186	4	.527	.069	.076
Online appropriateness	.107	2	.948	.018	.019

* $p \leq .05$

While most online instructors overwhelmingly preferred teaching FTF, students were split between FTF and online. Instructors' and students' perspectives were similar on discipline, cost investment, happiness with and online appropriateness. Both groups felt that more discipline was required online than FTF. The majority of instructors and students were indifferent to the cost differences, happiness online, and felt that online was appropriate for the institution.

DISCUSSION

As part of an on-going study at one institution and prior to the pandemic, business students and instructors generally perceived FTF more favorably than online education for individual factors. As experience in online education increased, research performed prior to the pandemic indicated that perceptions of equivalences between FTF and online educations were positively related. The pandemic forced more instructors and students to experience online education. This study represents a comparison between business students' and instructors' perceptions during the same time period at the same institution for individual factors, and may be one of the first to perform such a comparison. It provides insight into the current gap between students and instructors in online perspectives.

The pandemic hastened movement online at the University as prior to the pandemic most students and instructor had not experienced online education (Fish & Snodgrass, 2018, 2020). As noted here, instructor and business student perspectives of online versus FTF for many individual factors were significantly different. With respect to individual factors, motivation, self-directed, independence, schedule flexibility, time investment, and preference for FTF were significantly different between instructors and students. Discipline, cost investment, happiness with online, and online appropriateness were not statistically different. These results speak to the different perspectives that the individuals in each group have with respect to online versus FTF education. As online education continues, these individual differences between instructors and students need be addressed. The challenge for education going forward is to bridge the gap between those delivering and those receiving the online experience.

Results show that students were more motivated FTF; were indifferent to the two environments for self-directed, cost investment, and preference for FTF; felt online required more discipline and time investment; and offered more independence and schedule flexibility. Instructors were more motivated and self-directed FTF; felt online required more discipline and time investment but offered more schedule flexibility; and were indifferent for independence and cost investment. Instructors preferred to be FTF. Both instructors and students were indifferent to happiness between the two environments and felt online education was appropriate at the University.

Similar to our prior studies (Fish & Snodgrass, 2018, 2020), instructors and students, while the strength of their perspectives differ on motivation, both groups favor FTF, which confirms some research (Lei & Gupta, 2010) and contrasts with others (Larson & Sung, 2009). For students, this research corresponds to online requiring more discipline (Jacob & Radhai, 2016; Tratnik et al., 2019). While prior research indicated that students perceived online as requiring more self-directedness (Weldy, 2018), students were indifferent for self-directed learning. In keeping

with our prior research (Fish & Snodgrass, 2018, 2020), instructors remained indifferent and students favored more independence online; however, both groups perceived online offered more schedule flexibility. With respect to time investment, the results correspond to online students indicating that they spend more time online (Perreault et al, 2008: Dobbs et al., 2009; Lovern & Lovern, 2013), and contrast with others that favor FTF as requiring more time (Weldy, 2018).

Instructors' perspectives on cost investment correspond to prior results (Fish & Snodgrass, 2018); however, current students are indifferent on cost, contrasting prior results (Fish & Snodgrass, 2020). With respect to their preferred environment, current students' perspectives are 'undecided', which contrasts other studies favoring FTF (Fish & Snodgrass, 2020; Pointer, Carden & Smith, 2019; Tratnik et al., 2019; Weldy, 2018). while current instructors preferred to be FTF, which corresponds to our prior study (Fish & Snodgrass, 2018). Student and instructor happiness online was indifferent, supporting some research (Cavanaugh & Jacquemin, 2015; Larson & Sung, 2009), and contrasting to others (e.g. Evans, 2015; Flanagan, 2014, Harmon, Alpert & Lambrinos, 2014, Mather & Sarkans, 2018; Spencer & Temple, 2021). Contrasting to prior research (Allen et al., 2012; Spencer & Temple, 2021), instructors and students felt online was appropriate. With instructors and students' perspectives significantly differing – and changing over time - on most factors, and therefore supporting or contrasting many prior studies, there is still much disagreement between the groups on these individual factors.

As noted in various research results and as we discussed in other articles (Fish & Snodgrass, 2014, 2015, 2018, 2020), the institution may play a significant role in students' and instructors' perspectives. Other institutions are more advanced in online education than the University studied, and this may play a role in the perspectives found in this study.

CONCLUSION

In summary, online instructors (who deliver the information) and business students (who receive it) have significant differences on individual factors, which may affect the learning environment. These differences need to be addressed in order to develop a more effective educational experience. Research performed prior to the pandemic indicated that individuals' perceptions will change and become more amenable to online education as the individuals experience online increases. As the pandemic subsides and technology continues to change, this population's adaptation to online education – and differences in perspectives between the provider and receiver remain as an issue.

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Lynn A. Fish, Ph.D. is a professor of management and marketing at Canisius University, Buffalo, NY. Her research interests include online student and instructor perceptions, innovative education, supply chain management, new product development, RFID, project management, quality management and sustainability.

Coral R. Snodgrass, Ph.D. is a professor emeritus of management and marketing at Canisius University, Buffalo, NY. She has published numerous articles on the topics of online student perceptions, strategy and international business and she has authored a number of strategy cases.

A Comparison of Instructor Perspectives of Online and Face-to-Face Education Before and During the Pandemic

Lynn Fish, Ph.D. and Coral Snodgrass, Ph.D., Canisius University, NY, USA

ABSTRACT

Instructors and their perspectives on online and face-to-face education are a critical component to education. While research into this topic has increased in recent years, it still remains sparse. In light of the abrupt switch for most courses to online education due to the pandemic, the purpose of this study is to compare instructor perspectives of online versus face-to-face education before and during the pandemic at a Jesuit, Catholic private University in the northeast. Changes in individual instructor and program factors are the salient factors that influence these perceptions and are reviewed.

Keywords: instructor perspectives, online education, face-to-face education

INTRODUCTION

In developing an effective educational experience, students' and instructors' perspectives with respect to online and face-to-face (FTF) education need to be considered (Shieh, Gummer & Niess, 2008). These perceptions will continue to evolve as technology evolves (Richardson et al., 2016). Little research has been done to examine instructors' perspective on online education, particularly among liberal arts faculty (Shreaves et al., 2020).

Research on perspectives reveals three broad categories of factors that may impact upon instructors' perspectives of education: demographic, individual and program. Demographic factors include age, gender, major or discipline, level taught, faculty rank, self-reported technological skill level, whether the instructor took an online training course and if so, where, and whether the instructor taught online and if so, how many courses they taught. Individual factors include motivation, discipline, self-directed learning and independence, schedule flexibility, time and cost investment, preference, happiness and appropriateness for learning environment. Program factors, which are decisions that the instructor makes in developing the course, studied include academic difficulty, academic integrity (cheating), student-to-student interaction, student-to-instructor interaction, and program technologies. (A deeper literature review on the individual and program factors can be found at Fish & Snodgrass (2014, 2015).) Prior to the pandemic in the fall of 2017, we conducted a study of instructor perspectives of online versus FTF education at a University that mainly focused on FTF education (Fish & Snodgrass, 2018a, 2018b). Prior results demonstrated a strong preference by instructors for the traditional FTF education for almost all individual and program factors studied.

As the pandemic began, courses moved mid-semester from FTF to online. Instructors scrambled to learn new software in real time and meet the previous FTF learning goals in a new modality. In spite of research indicating that an existing FTF course cannot merely transition online (Means et al, 2013), instructors were forced to do so quickly. Truly, these modified courses were not 'true' online courses. In reality, subtle differences between online and FTF modalities include pedagogical aspects such as teaching fundamentals, developing a relationship with students, providing stimulating content, and timely feedback (Brocato, Bonanmo & Ulbig, 2015). The University was able to offer FTF classes in the fall 2020, and therefore, a few instructors and students have not experienced a specifically-designed online semester course. Following the pandemic, higher education will look very different than prior to the pandemic. An understanding of instructors' and students' perspectives and their differences is needed as results may guide future online pedagogy, instructional strategy and technology integration to support online learning (Redman & Perry, 2020). As part of a large study, one full year into the pandemic (April 2021), instructors were surveyed again on their perspectives. This study offers insight into the changes in instructor perspectives on instructor (individual) and program factors from prior to the pandemic to during the pandemic. Due to an increase in the number of instructors teaching online due to the pandemic, this leads to our research question: *Have instructors' – those that have taught and those that have not taught online – individual and program perspectives of online education compared to face-to-face (FTF) education changed over time?*

In general, instructors resist teaching online (Mitchell, Parlamis & Claiborne, 2015; Vivolo, 2016), and are skeptical of online education (Allen & Seamen, 2015, 2016). Faculty acceptance of online education remained unchanged

between 2003 and 2015 with an acceptance rate of only 30% (Allen & Seaman, 2015). While information gathered between 2003 and 2015 indicates some decrease in the negative perceptions of online education, in 2015, over 25% of faculty still report that learning outcomes in online education were inferior compared to FTF education (Allen & Seaman, 2016). As for the appropriateness of online education, some online instructors still question the fit between their educational philosophies and online teaching (Terosky & Heasley, 2015). Over time, faculty perceptual changes related to online delivery can influence instructional pedagogy and the use of technology in online education (Redman & Perry, 2020). Their perceptions of online delivery can influence interactional, instructional and technology use to crease an online course environment that decreases the transactional gap and promotes learning (Gregory & Martindale, 2017; Kebritchi, Lipschuetz & Santiague, 2017). In yet another study, 2016 faculty rated interaction (student-to-student, student-to-instructor, participation required, and instructor feedback) and instruction items (use of variety of instructional techniques, course organization/clear expectations and clear criteria for student assessment) lower compared to 2002 and 2007 faculty groups (Redman & Perry, 2020).

We have been researching student and instructor online versus FTF perspectives for over a decade at a mid-sized, Jesuit, Catholic private school in the northeast United States with a focus on teaching. Class sizes at the institution average 17 students, and instruction focuses on arts and sciences, education and business. In our initial spring 2017 survey, roughly half the responding instructors had taught online. Online instructors indicated that they were not as motivated online, while FTF instructors were more motivated FTF. Online instructors felt online required more discipline, while FTF instructors were more indifferent to the environments. Online and FTF instructors leaned toward the FTF environment as more self-directed than online. Each group slightly favored their environment as offering more independence. Both groups tended to favor online as offering more schedule flexibility. Online instructors felt they invested more time online, while FTF instructors were more indifferent. As for cost investment, online instructors did not note differences, but FTF instructors tended to indicate that FTF cost more. In the 2017 study, online and FTF instructors felt that it was easier to cheat online than FTF, and both online and FTF instructors felt the student-to-student interaction and student-to-instructor interaction was greater in the FTF environment. Interestingly, difficulty was not viewed the same in our prior study as online instructors felt the difficulty was greater online, while the FTF instructors were more indifferent. The original results demonstrated that over 75% of instructors at the University preferred to teach FTF, and instructors favored FTF education on all factors. While instructors were 'okay' with online teaching, FTF instructors (60%) were very happy with the FTF environment. Prior to the pandemic, online and FTF instructors at the institution favored FTF education. The majority of online instructors felt online education was appropriate at the university, but a significant portion of the FTF instructors were undecided or indicated that it was not appropriate. With the pandemic, most classes – but not all – transitioned online.

We continue with a brief research update on the instructor individual and program factors since our prior study (Fish & Snodgrass, 2018a,b).

INSTRUCTOR FACTORS

Instructors are influenced by personal preferences and the need for faculty resources (pedagogical training, time and compensations), more effective technology and infrastructure (Shreaves et al., 2020). Factors that encourage online teaching include personal challenge, satisfaction, flexibility, convenience, greater student access, unique instructional options, and institutions rewards and recognition (Shreaves et al., 2020). However, instructor beliefs that online education requires more time and increases the workload, technology issues, student engagement becomes more complex, course quality concerns, and fear or resistance to change all discourage online teaching (Shreaves et al., 2020). Respective to the individual factors tracked in this study, updates include the following:

Motivation. As a result of online teaching, faculty reported increased confidence and improvements in FTF courses as a result of online teaching (Chiasson, Terras & Smart, 2015) and may enhance FTF teaching, confidence, motivation and attitudes towards online teaching (Borup & Evmenova, 2019). To encourage online instruction, Institutions may recognize and reward online teaching in the promotion and tenure process, teaching awards, course releases and possibly, financial stipends (Betts & Heaston, 2014; Hoyt & Oviatt, 2013; Johnson, Stewart & Bachman, 2015). In our prior research, instructors indicated a significant difference in their motivation online versus FTF and favored the FTF environment (Fish & Snodgrass, 2018b).

Discipline/Self-directed Learning. One research study reported that instructors perceive online courses as offering less control when teaching (Chiasson et al., 2015). Our prior studies showed that online and FTF instructors' perspectives significantly differed on both discipline and self-directed (Fish & Snodgrass, 2018b). Online instructors

felt that more discipline was required online than FTF, but they were relatively indifferent to the environment for self-directed.

Independence. Prior research for instructors indicated that individual perspectives between online and FTF education are significantly different for independence; however, instructors at the institution were relatively indifferent to the two environments prior to the pandemic (Fish & Snodgrass, 2018b).

Schedule Flexibility. Schedule flexibility is often noted as a driving factor as to why instructors – and students - choose online classes (Shreaves et al., 2020). Factors that influence an instructors' preference to take online professional development courses instead of FTF included the ability to work anytime and from any Internet accessible computer (Thomas, 2010). In our prior study, online instructors favored online as offering more schedule flexibility studies (Fish & Snodgrass, 2018b).

Time Investment. Instructors believe online education requires more instructor time and increases their workload (Shreaves et al., 2020). They perceive online courses require more time to develop (Chiasson et al., 2015). To instructors, barriers to online teaching include faculty time, rewards, workload, lack of administrative support, cost, course quality and technology issues (Chang, Shen & Liu, 2014). Our prior research found instructors perceived online and FTF as being significantly different for time investment as instructors felt that they spent more time online (Fish & Snodgrass, 2018b).

Cost investment. Research often cites the cost-effectiveness to the individual and institutions in offering and taking online courses, and cost savings may be fueling the demand for online (Nguyen, 2015). Nevertheless, another study stated that barriers to online teaching includes cost (Chang et al., 2014). In our prior study, we found that instructors did not see a significant difference with respect to cost investment between online and FTF as online instructors were indifferent to the cost investment (Fish & Snodgrass, 2018b).

Preference for Opposite Environment. Research performed over a decade ago, found that instructors perceived online instruction to be inferior to FTF instruction (Fish & Gill, 2009; Wilson, 2001), and sixty-percent of instructors at a four-year institution reported feelings of fear (related to resistance to teach online as they fear technology as too time-consuming, fear failure or feat the loss of a comfortable and successful approach to teaching) (Allen et al, 2012). Instructors' perceptions of their own technical skills affect their willingness to teach online (Shreaves et al., 2020). Specific to our research on preferred environment, our survey asked the respondent if they would prefer to be in the 'opposite' environment to the perspective they were responding from. Our prior research found a significant difference between instructors in their perspectives of online and FTF preferences as online instructors were indifferent (Fish & Snodgrass, 2018b).

Happiness with environment. Our research specifically asked respondents if they were 'happy' with the environmental perspective that they were responding from (online or FTF). Instructors noted a significant difference between online and FTF education as online instructors were indifferent to the two environments (Fish & Snodgrass, 2018b).

Online appropriateness. Instructor acceptance of online education remained relatively unchanged between 2003 and 2015, with an acceptance rate of only 30%,; by 2015, over 25% still reported that learning outcomes online were inferior to FTF (Allen & Seaman, 2016). For instructors at the institution under study, our prior research revealed that online and FTF instructors significantly differed on the appropriateness of online education as online instructors viewed online as appropriate (Fish & Snodgrass, 2018b).

PROGRAM FACTORS

Program factors relate to the course design and activities included in the program design, and can be grouped into three main areas of study: program attributes, communication among and between students and instructors, and program design and activities. With the shift from FTF to online education, the instructor's role shifts from control and direction to facilitation and support of self-directed learning through instruction and the integration of materials, activities and resources to create an experiential learning environment (Redman & Perry, 2020). Instructor perspectives regarding online education impact instructional pedagogy and technology use (Redman & Perry, 2020). Integrating course technology and faculty competency with that technology are of greater importance compared to interactional and instructional factors (Redman & Perry, 2020). As more instructors experience online education, the

lower importance for instructional techniques may reflect an increase in instructor competency using online technology as well as digital natives entering higher education teaching (Redman & Perry, 2020). Another recent study noted that over time, instructors gave less importance to online delivery factors (Perry & Steck, 2019). Program factors that we have been tracking include difficulty, student-to-student interaction, student-to-instructor interaction, and cheating. A few noteworthy research updates include:

Difficulty. In the past, faculty perceived online education to be more challenging than FTF instruction (Connolly, Jones & Jones, 2007). In our original study (2017, instructors did not agree on their perspectives of online versus FTF difficulty as online instructors indicated that online education was significantly more difficult than FTF, while FTF instructors felt the environments were similar (Fish & Snodgrass, 2018b).

Student-to-Student Interaction / Student-to-Instructor Interaction. Student-to-student and student-to-instructor interaction are critical factors to student learning and motivation. While students dislike required collaborative activities, instructors believe that student collaboration promotes learning and cognitive development (Fedynich, Bradley & Bradley, 2015). Quality and timeliness influencing teaching presence, while social presence seems to be underpinned by communication between students or between students and the instructor (Miller, MacLaren & Xu, 2020). In a recent study, instructors believe online education is less effective on promoting student-to-student interaction (Shreaves et al., 2020). Research reported that students appreciate online instructors who provide clear course requirements and explanations and are responsive to their needs (Redman & Perry 2020). Even when an instructor doesn't perceive the need for student-to-instructor communication, instructors agree that participation and engagement are important factors in the online environment (Richardson et al., 2016). In our original study, online and FTF instructors perceived online education as offering less interaction than online (Fish & Snodgrass, 2018a). However, in a recent study, the level of importance by instructors given to student-to-student and student-to-instructor interaction decreased between 2002 and 2016 (Redman & Perry, 2020). The interaction subscale included student-instructor interaction, collaboration among students, active class participation required, and timely instructor feedback, while the instruction subscale included use of a variety of instructional techniques, course organization/clear expectation and clear criteria for student assessment.

Cheating. Faculty and students typically perceive online education as being easier to 'cheat' in (Fish & Snodgrass, 2018a). With changes in proctoring online education and detecting cheat, such as Turnitin.com, has this perspective changed?

Summary. As the pandemic fostered an increase in online courses and technology continues to change, understanding whether instructor perspectives are changing is an important aspect to consider, and research into instructor online perspectives is sparse and needed. Moving forward, the pandemic and response to online instruction in higher education may result in courses that look very different moving forward compared with before the pandemic; however, some recognize that online teaching may never fully replace FTF learning (Radcliffe et al., 2020). The studies reported above differed in institutional size, audience, method of research, and the study's context may be an important factor to consider in interpretation of the survey results. With this in mind, the intent of this study is to evaluate whether instructors' perspectives have changed. Theoretically, instructors should perceive the environments equally and neither favor FTF nor online education.

METHOD

In spring 2017 and spring 2021, as part of a larger study, instructors at an AACSB-accredited, Jesuit, Catholic, private University in the northeast received the same online survey. Each online survey was available for a month, and it was sent to instructors three times over the month. University Internal Review Board and Academic Vice President approval for distribution was granted for both survey times. University instructors are responsible for delivery of online content, do not have online course designers, and are encouraged to use the University's platform (Desire2Learn) as well as other software and programs (Youtube, Dropbox, etc.) in course delivery. (The instructor survey can be accessed at: DOI: https://dx.doi.org/10.15239/j.brcacadje.2018.08.01.wa02). Demographic questions included age, gender, respective school the instructor associates with, teaching level (undergraduate, graduate or both), level taught, faculty rank, self-reported technological skill level, online course experience as a student, and online teaching experience. Then, instructors who have taught at least 1 online course complete Section A (online perspective), while instructors who have never taught in the online environment complete Section B (FTF perspective). Sections A and B have corresponding questions on the perceptions noted; however, Section A statements are specific to "*I found*" versus Section B statements are "*I perceive*". The survey used a five-point Likert scale for each of the

factors: significantly dislike, dislike, okay, like, significantly like. The last questions in each section asked the instructor if the instructor would prefer the opposite environment, the instructor's emotional happiness with the learning environment, and whether the instructor felt that online courses were appropriate for the institution. For instructors with online experience, the last open-ended question inquired as to why they chose to offer an online course. For instructors without online experience, the survey included an open-ended question inquiring 'why not'.

ANALYSIS

As shown in Table 1, half of the instructors (41) complete the original survey before the pandemic from the online perspective and half (41) completed it from the FTF perspective. Due to the pandemic, there was a significant shift to online teaching experience as over 79% of the respondents (93) completed the survey during the pandemic from the online perspective and only 21% completed it from the FTF perspective (25). Table 2 and 3 shows the number of responses for each survey for the online instructors and FTF instructors prior to the pandemic (2017) and during the pandemic (2021). The instructor average perceptual responses for 2017 and 2021 for both the online and FTF groups can be noted in Table 4 to give the readers some contextual understanding.

Table 1. Number of Instructors Online & FTF 2017 and 2021

Survey Year	Online	FTF	Total
2017	41	41	82
2021	93	25	118
Total	134	66	200

Table 2. Number of Responses by Factor for **Online** Instructors in 2017 and 2021

Factor	2017					2021				
	1	2	3	4	5	1	2	3	4	5
Individual Factors										
Motivation	4	7	24	2	4	12	21	50	6	4
Discipline	1	3	12	14	11	2	7	34	30	19
Self-directed	7	8	14	9	3	22	24	30	9	7
Independence	3	4	16	14	4	14	19	24	30	6
Schedule flexibility	1	4	11	14	11	6	18	14	39	15
Time investment	2	3	8	16	12	1	2	26	39	24
Cost Investment	0	6	26	4	1	7	15	56	10	4
Preference opposite?	18	11	12			54	19	17		
Happiness with environment	3	6	12	10	10	13	16	30	19	14
Appropriateness	30	8	3			53	19	20		
Program Factors										
Difficulty	1	6	14	14	6	2	6	29	37	18
Student-to-Student Interaction	5	14	12	9	1	24	35	21	10	3
Student-to-Instructor Interaction	5	10	16	6	4	17	38	27	8	3
Cheat	6	14	20	0	1	25	29	34	1	2

Table 3. Number of Responses by Factor for **FTF** Instructors in 2017 and 2021

Factor	2017					2021				
	1	2	3	4	5	1	2	3	4	5
Individual Factors										
Motivation	0	1	9	11	19	0	0	3	10	12
Discipline	0	7	18	11	4	2	6	12	4	1
Self-directed	1	1	6	13	19	0	0	2	7	16
Independence	0	3	14	12	10	0	1	5	8	11
Schedule flexibility	1	11	12	8	6	1	5	10	3	6
Time investment	0	11	19	9	2	1	11	7	5	1
Cost Investment	0	9	13	14	3	1	7	9	8	0
Preference opposite?	3	7	31			0	1	24		
Happiness with environment	0	0	3	13	24	0	0	0	9	16
Appropriateness	20	13	8			10	9	6		
Program Factors										
Difficulty	3	11	12	13	2	5	9	6	5	0
Student-to-Student Interaction	0	4	5	10	20	0	0	1	8	16
Student-to-Instructor Interaction	0	1	6	11	21	0	0	1	5	19
Cheat	0	2	10	20	8	0	0	4	13	8

Table 4. Instructor Average Perceptional Responses –2017 & 2021 Online versus Face-to-Face

Factor	2017 Instructors Average Response		2021 Instructors Average Response	
	Online	Face-to-Face	Online	Face-to-Face
Individual Factors				
Motivation	2.88	4.2	2.67	4.36
Discipline	3.76	3.30	3.62	2.84
Self-directed	2.83	4.20	2.51	4.56
Independence	3.29	3.74	2.95	4.16
Schedule flexibility	3.73	3.18	3.42	3.32
Time investment	3.80	3.05	3.90	2.76
Cost investment	3.05	3.28	2.88	2.96
Preference opposite?	1.85	2.68	1.59	2.96
Happiness with environment	3.44	4.54	3.05	4.64
Appropriateness	1.34	1.71	1.64	1.84
Program Factors				
Difficulty	3.44	3.00	3.68	2.44
Interact between students	2.68	4.18	2.28	4.60
Interact instructor-student	2.85	4.33	2.38	4.72
Cheating	2.41	3.85	2.19	4.16

Since the survey data was discrete, Chi-Square analysis using the contingency coefficient as the nominal value was performed for the factors. Given the direction of the scales in this study, when instructors in one group favor the same environment as the other group, then a significant difference results through the analysis. Comparison of the 2021 online and FTF instructors demonstrated significance for every factor except appropriateness as shown in Table 5. Online instructors and FTF instructors were more motivated FTF than online. FTF instructors perceived the environments to be about the same with respect to discipline as both groups indicated that online required slightly more discipline than FTF. With respect to self-directed, online instructors felt the online environment offered slightly less self-directed, while FTF instructors perceived the FTF environment offered significantly more self-directed aspects than online. Again, both groups essentially felt that FTF offered more with respect to self-directed. FTF

instructors perceived the FTF environment offered more independence than online, but online instructors felt the environments were the same. As for schedule flexibility, online instructors perceived the online environment offered more schedule flexibility, while FTF instructors felt the FTF environment offered slightly more on schedule flexibility than online. Both FTF and online instructors felt that online required more time investment, but they were indifferent to the cost investment between online and FTF. While online instructors are undecided about switching to the FTF environment and are indifferent on happiness, FTF instructors overwhelmingly do not want to switch to online and are very happy in the FTF environment. Online and FTF instructors perceived online to be more difficult than FTF. Similarly, both groups perceived the student-to-student and student-to-instructor interaction to be significantly more in the FTF environment than online. Both groups also perceived that cheating online was easier to do than FTF. With respect to the only factor that was insignificant between the two groups – appropriateness of online, most online (57.6%) and FTF (40%) instructors felt that online was appropriate; however, many instructors were undecided or felt it was inappropriate.

Table 5. Chi-Square Analysis based upon Instructor Online vs FTF 2021

Metric	Pearson Chi-Square Value	Df	Asymptotic Significance (2-sided)	Pearson's R	Spearman Correlation
Individual Factors					
Motivation	60.626	4	.000 *	.583	.616
Discipline	12.370	4	.015 *	-.317	-.316
Self-directed	53.423	4	.000 *	.613	.601
Independence	26.455	4	.000 *	.405	.409
Schedule flexibility	11.803	4	.019 *	-.067	-.053
Time investment	39.037	4	.000 *	-.474	-.448
Cost investment	10.785	4	.029 *	.038	.047
Preference opposite?	50.925	2	.000 *	.627	.618
Happiness with environment	36.212	4	.000 *	.500	.524
Appropriateness of Online	3.112	2	.211	.100	.116
Program Factors					
Difficulty	31.267	4	.000 *	-.472	-.442
Student-to-Student Interaction	70.537	4	.000 *	.696	.656
Student-to-Instructor Interact	78.281	4	.000 *	.726	.674
Cheat	79.876	4	.000 *	.679	.658

* $p \leq .05$ ** $p \leq .10$

As shown in Table 6, even though there were significantly more instructors who had experienced online teaching, there were no significant changes in online instructor perspectives from 2017 to 2021 for any factor. While the shift was statistically insignificant, all of the factors except time investment, appropriateness and difficulty, shifted from favoring online toward being less favorable with the online environment (that is, a decrease in the average and being 'less' favorable towards online). Time investment and difficulty all shifted toward an increase in the average towards online investment having 'more' than FTF. As for appropriateness, online instructors changed from saying it was appropriate towards being undecided if it was appropriate.

Table 6. Chi-Square Analysis based upon Online Instructors 2017 v 2021

Metric	Pearson Chi-Square Value	Df	Asymptotic Significance (2-sided)	Pearson's R	Spearman Correlation
Individual Factors					
Motivation	2.303	4	.680	-.102	-.094
Discipline	-.064	4	.910	-.064	-.072
Self-directed	4.245	4	.374	-.124	-.135
Independence	5.344	4	.254	-.140	-.129
Schedule flexibility	6.673	4	.154	-.125	-.112
Time investment	4.836	4	.305	.048	.007
Cost investment	3.191	4	.526	-.06	-.079
Preference opposite?	3.101	2	.212	-.151	-.153
Happiness with environment	2.829	4	.587	-.142	-.141
Appropriateness of Online	4.530	2	.104	.180	.170
Program Factors					
Difficulty	2.793	4	.593	.119	.118
Student-to-Student Interaction	5.623	4	.229	-.174	-.185
Student-to-Instructor Interact	6.996	4	.136	-.201	-.207
Cheat	3.387	4	.495	-.117	-.125

* $p \leq .05$ ** $p \leq .10$

No significant differences in perspectives were noted for FTF instructors between 2017 and 2021 as well, as shown in Table 7. While statistically significant changes were not noted, the average shifted towards favoring the FTF environment occurred for all of the factors except discipline, time and cost investment and difficulty, where a slight shift towards online was detected. (There was a slight significance noted for preference for the opposite environment as the 2021 survey participants overwhelmingly did not want to teach online in comparison to the 2017 participants. Essentially, the instructors who had never taught a full online course that remained as the pandemic continued did not want to teach online or even consider it.)

Table 7. Chi-Square Analysis based upon FTF Instructor 2017 v 2021

Metric	Pearson Chi-Square Value	Df	Asymptotic Significance (2-sided)	Pearson's R	Spearman Correlation
Individual Factors					
Motivation	2.289	5	.515	.096	.068
Discipline	5.157	4	.272	-.243	-.228
Self-directed	2.742	4	.602	.203	.186
Independence	3.201	3	.362	.218	.222
Schedule flexibility	2.112	4	.715	.059	.059
Time investment	4.394	4	.355	-.158	-.167
Cost investment	3.730	4	.444	-.174	-.154
Preference opposite?	4.794	2	.091 **	.265	.268
Happiness with environment	1.938	2	.379	.097	.056
Appropriateness of Online	.497	2	.780	.083	.085
Program Factors					
Difficulty	4.650	4	.325	-.255	-.248
Student-to-Student Interaction	4.485	3	.214	.231	.184
Student-to-Instructor Interact	4.053	3	.256	.252	.243
Cheat	2.741	3	.433	.197	.187

* $p \leq .05$ ** $p \leq .10$

DISCUSSION

During the pandemic (2021), results revealed a significant difference for all individual and program factors except for appropriateness of online education. Given the perspective and scale directionality, these results demonstrate that online and FTF instructors shared similar perspectives on all of these factors, but appropriateness of online education. These results, while not a significant change for either online or FTF instructors from the survey prior to the pandemic (2017), differ as prior results were not significant for all factors. (Discipline, independence, schedule flexibility and difficulty were not significant in 2017.) Interestingly, current instructors – whether they answered the survey from the online or FTF perspective, are more 'similar' in their perspectives than 4 years earlier. It's important to note that these results are not from the immediate change to online education that most institutions experienced in the spring of 2020, but rather after an entire year into the pandemic (April 2021). Additionally, more instructors have taught at least one complete online course and few FTF instructors remain. The FTF instructors that remain have managed to navigate the University system to maintain FTF classes when many were encouraged to go online due to the pandemic. In spite of one full year of the pandemic, online and FTF instructors have not changed in their individual or program perceptions of online versus FTF education. The FTF instructors that remain are stalwart in their perceptions and do not want to teach a full course in the online environment. While the shift toward FTF was not significantly different than the past for either online or FTF instructors, many online instructors are less favorable toward online for most factors than they were in the past (as noted by the average change). While FTF instructors tended to shift toward a more positive attitude toward FTF than in the past.

Past researchers noted a need to incentivize instructors to teach online (Betts & Heaston, 2014; Hoyt & Oviatt, 2013; Johnson, Stewart & Bachman, 2015; Shreaves et al., 2020). In spite of a pandemic and the real possibility of individual consequences by teaching in a FTF classroom, the instructors at this University are still not motivated to teach online. With the shift to online education, many more instructors experienced online education; however, in contrast to prior research (Borup & Evmenova, 2019; Chiasson et al., 2015), online instructors in this study did not improve their perception of online education. While not significantly different on any factor, current online instructors are less favorable on most factors than 4 years prior. In contrast to prior research that indicated that online education supports student self-direct learning more than FTF (Broadbent & Poon, 2015; Cochran & Benuto, 2016; Kebritchi et al., 2017), the instructors in both groups favor self-directed learning in the FTF environment. Current results demonstrate continued support for the belief that online education requires more time investment than FTF (Chiasson et al., 2015; Shreaves et al., 2020). Interestingly, both instructor groups were relatively indifferent to the schedule flexibility of their environment, which is often cited as a reason to teach online (Thomas, 2010). On average online instructors during the pandemic were more indifferent to the schedule flexibility online has to offer than online instructors prior to the pandemic. Both online and FTF instructors did not perceive a significant difference in cost investment between the two environments. Over 15 years ago, research indicated instructors would gravitate towards instructional practices that they were most comfortable with (Hinson & LaPrairie, 2005). For both survey years, online instructors are undecided about switching back to FTF education, but the FTF instructors are more adamant than in the past that they do not want to teach online and are very happy in the FTF environment.

In keeping with prior research where instructors questioned the rigor of online (Teosky & Heasley, 2015) and instructors at this institution perceived online to be more difficult than FTF. Additionally, this research supports prior research that indicated that online education is less effective in promoting student-to-student and student-to-instructor interaction (Connolly, Jones & Jones, 2007; Guidera, 2004; McQuiggan, 2012). While not a statistically significant shift, online and FTF instructors during the pandemic favored the FTF environment for interactions for both of these factors more than prior to the pandemic. Instructors appear to be less favorable to the 'personal' aspects of online than in the past. In keeping with our prior study and other studies (Fish & Gill, 2009), cheating is still regarded as being easier online than FTF.

A shift in the faculty's perception of the appropriateness of online education at the institution may be occurring as appropriateness was the only factor that was not significant. Prior to the pandemic, online instructors overwhelmingly supported online as being appropriate with only 7.3% indicating that it was not; however, online instructors during the pandemic were not as sure that it was as 21.5% indicated that it was not appropriate. The results for the FTF instructors were similar between the two surveys as roughly 20% or more felt online was inappropriate. These results are similar to another study where instructors questioned the fit for online teaching (Terosky & Heasley, 2015). Clearly, the remaining FTF instructors are very happy teaching in the FTF environment and do not want to switch to teaching online.

While more digital natives are entering higher education as time passes, for this institution, the majority of faculty still prefer the FTF environment over the online environment for most factors which is in contrast to prior research (Redman & Perry, 2020), but in keeping with the past results for this population (Fish & Snodgrasss, 2018a, 2018b). While not significantly different, online and FTF instructors during the pandemic favor the FTF environment more than the instructors prior to the pandemic. As we have noted in prior papers, these results may be related to this University and other Universities may have different results. These results offer one 'datapoint' in the continued change in the educational landscape.

CONCLUSION

This study evaluated instructor perceptions for online versus FTF instruction at a Jesuit, Catholic, private institution in the northeast. The focus of this paper was on evaluating the changes in individual instructor and program factors during the pandemic from results prior to the pandemic. In spite of the massive shift to online teaching in higher education due to the pandemic, these results demonstrate that faculty at this institution still prefer FTF education over online education for the individual and program factors studied. The online and FTF instructors appear to be more homogenous than in the past study. It appears that the online faculty are less favorable toward online teaching, while FTF faculty are more favorable with FTF than in the past. In spite of improvements in technology over the four years and at least one year of online teaching, online and FTF instructors do not yet perceive the environments equally. As the pandemic wanes and technology continues to improve, monitoring this change is important to educational improvements in both environments.

Limitations. Given the pandemic, many instructors were forced to develop online courses for their own personal reasons. This study was conducted one full year into the pandemic and only 25 FTF instructors completed the FTF view (Section B). However, their perceptions mirror past responses. Additionally, this research was conducted at one private, Jesuit, institution, and as we've noted previously, results at other institutions may differ significantly.

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Lynn A. Fish, Ph.D. is a professor of management and marketing at Canisius University, Buffalo, NY. Her research interests include online student and instructor perceptions, innovative education, supply chain management, new product development, RFID, project management, quality management and sustainability.

Coral R. Snodgrass, Ph.D. is a professor emeritus of management and marketing at Canisius University, Buffalo, NY. She has published numerous articles on the topics of online student perceptions, strategy and international business and she has authored a number of strategy cases.

Lowered Barriers: The Shifting Perception of Sales Careers Among U.S. Undergraduate Students and Its Impact on Sales Education

Dae-Hee Kim, Christopher Newport University, Newport News, VA, USA
Lisa Spiller, Christopher Newport University, Newport News, VA, USA

ABSTRACT

Despite the high demand for sales positions across various business sectors today, the sales curriculum remains underrepresented in U.S. business school curricula. A significant barrier to the development of more robust sales programs has been the prevailing negative perceptions associated with sales professions. Prior research indicated that business students had negative stereotypes about sales professions, contributing to a general disinterest in pursuing sales careers. This study investigates the perceptions of sales careers among business students at an AACSB-accredited mid-size university in the United States. Contrary to the prevailing literature, our findings reveal a more nuanced and balanced perspective on sales careers, challenging the predominantly negative perception. Students majoring in management and marketing showed a markedly more positive attitude towards sales careers compared to their peers in accounting and finance. Remarkably, the perceptions of freshmen and sophomores were significantly more positive than those of juniors and seniors. Moreover, students across all majors and academic levels expressed a high regard for sales courses within the business curriculum. These findings advocate for business programs to expand their sales course offerings and develop comprehensive sales curricula, enabling interested students to effectively prepare for and pursue careers in the highly sought-after field of sales.

Keywords: Sales education, Sales perceptions, Sales careers, Sales curriculum

INTRODUCTION

The need for qualified sales representatives in the United States is sizeable and continues to grow. However, despite this great demand, there is a shortage of qualified applicants. A portion of this shortage could stem from the intense competition in the sales fields to attract and retain the right sales professionals within the limited pool of sales talent. An ongoing factor potentially contributing to this shortfall is the lack of formal academic programs catering to sales professions in higher education. Over the past decade, colleges and universities have recognized this need in the market and some schools have created educational sales programs; while many others are now offering a few sales courses to formally prepare their students for careers in sales.

One of important reasons for the hesitation among business programs to establish or expand sales education stems from the negative stereotypes associated with sales professions. This sentiment has been thoroughly documented in prior research examining university students' perceptions of careers in sales. Specifically, this adverse perception, especially prevalent among students in business programs, poses significant challenges for business schools aiming to adapt their curricula to meet the increasing demand for sales talent.

The purpose of this study is to ascertain current perceptions among business students—both as a whole and within these potential segments—regarding the pursuit of a career in sales. With its findings, we aim to provide practical knowledge and information useful to establish sales curriculum in business programs.

SALES CAREER AND HIGHER EDUCATION

The sales field continues to grow at a rapid pace. The U.S. Bureau of Labor Statistics (2022) indicated that 13.2 million workers are currently employed in sales-related positions. This number is projected to show little or no change, with a loss of about 202,900 jobs from 2020 to 2030 (U.S. Bureau of Labor Statistics, 2021). Currently, the total number of salespeople in the U.S. numbers more than six times that of the entire federal government workforce. The Bureau's *Occupational Outlook Handbook* reports that sales workers in the services and wholesale sectors will continue to be in demand because these occupations remain critical in building and maintaining customer bases for businesses (U.S. Bureau of Labor Statistics, 2021). However, despite the plethora of sales position opportunities, filling these positions with qualified candidates is challenging (Agnihotri, Bonney, Dixon, Erffmeyer, Pullins, Sojka, and West, 2014).

According to the *2021 ManpowerGroup Employment Outlook Survey*, sales positions are listed as third globally and fifth in the United States as the hardest positions to fill (ManpowerGroup, 2021).

College graduates have traditionally been a prime source for filling available sales roles, with statistics revealing that up to 60 percent of business majors and an impressive 88 percent of marketing majors take up sales-related positions upon graduation (Bolander, Bonney, and Satorino, 2014; Stevens and Kinni, 2007). Furthermore, over half of all U.S. college graduates, regardless of their major, begin their careers in roles that include sales-related duties (Cespedes and Weinfurter, 2016). Despite this strong demand and the high rate of placement in sales positions post-graduation, a limited number of business programs actively incorporate sales education into their curriculum. Among AACSB-accredited business programs in the U.S., only 21 percent offer a sales curriculum, with a mere 15 offering MBA or sales-oriented master's programs.

Given that most college students want to secure employment upon graduation, coupled with the strong desire of organizations to recruit college graduates, filling the growing number of sales positions available would seem to be an easy "win-win" scenario. The question is: why do many colleges remain hesitant to integrate sales education into their business programs?

Negative Stereotypes Associated with Sales

Stereotypes can be defined as the cognitive component of prejudice, meaning that they are mental representations of wider negative attitudes toward groups (Aronson, Wilson, and Akert, 2004). Unfortunately, even today, stereotypes are the "lens" through which many college students view the field of sales. Previous studies have concluded that many college students possess negative perceptions about the field of sales and a sales career (Mason, 1965; Weeks and Muehling, 1987; Lee, Sandfield and Dhaliwal, 2007; Fournier, Chéron, Tanner, Bikanda, and Wise, 2014; Cardinali, Giovannetti, Kulaga and Lorenzo, 2019). For college students, the field of sales carries the negative stigma associated with the unprofessional, unethical, insincere, pushy, arrogant, and coercive "used car salesman" (Babin, Boles, and Darden, 1995; Sojka, Gupta, and Hartman, 2000; Lee, Sandfield, and Dhaliwal, 2007; Magnotta, 2018). When asked to associate an animal to salespeople, students identified mostly predators, felines, aggressive or manipulative animals, reinforcing the stereotypical perspective that salespeople need to be aggressive and temper their honesty and clarity to be successful (Cardinali, Giovannetti, Kulaga, and Governatori, 2016). In simpler terms, salespeople have been viewed as being aggressive and sometimes using unethical sales tactics to maximize short-term sales volume (Weitz and Bradford, 1999). Cross-cultural research by Fournier, Chéron, Tanner, Bikanda, and Wise (2014) revealed the similar negative perceptions on salespeople among business students in different countries: Cameroon, France, Japan, Mexico, and United States.

These negative perceptions may originate and be reinforced from various factors such as familial influences, peer opinions, cultural norms, and media portrayals. Personal experiences with unethical behavior from salespeople can also contribute to these negative perceptions (Lee, Sandfield, and Dhaliwal, 2007). Most college students have formed a low opinion of sales careers long before entering higher education. Inks and Avila (2018) investigated high school students' perceptions of sales as an area to study in college and they found that perceptions are shaped by views of sales professionalism, how others view salespeople, and their own level of sales knowledge. Mass media, including novels, short stories, and stage productions, has had a profound impact on reinforcing the negative perceptions of sales and salespeople. For decades, sales humor and jokes about salespeople have perpetuated many of the negative stereotypes and attitudes towards sales, as has fiction novels of traveling salesmen and portrayals of salesmen in plays (Thompson, 1972). Content analysis research has found that television and movies over the past 100 years have consistently characterized salespeople in a negative manner, including being deceptive, shady and villains (Hartman, 2006). Web-based media provides negative images of sales positions as well given that the Internet is a growing portal to movies and television through direct downloads. For example, YouTube provides hundreds of negative, stereotypical images of salespeople under the entertainment heading "Salespeople Behaving Badly" (Waldeck, Pullins, and Houlette, 2010). Furthermore, the lack of sales education in most university curricula implies that many students don't get the opportunity to challenge or change these stereotypes, leaving problematic perceptions unaddressed. Table 1 presents a selection of literature addressing the negative stereotypes linked with sales professionals throughout various time periods.

Some may argue that perhaps there is a degree of truth to the negative stereotypes that have been levied against sales (Zeiger, 1995; Butler, 1996). However, the field of sales has undergone substantial evolutions in its principles and practices. Historically, personal selling has been viewed from a strict transaction-orientation, which rewards a mindset that focuses solely on revenue generation (Cespedes, 1994). Otherwise, the modern sales field is based on

Table 1: Sales Stereotypes*

Year	Author(s)	Title/Publication	Associated Characteristics/Traits	Sample Size
1958	Staunton, D.J.	I Didn't Raise My Boy to Be a Salesman, *Management Review*	travel, money, personality, sales, fast talker, commission appearance, products, high-pressure, aggressive	3,000
1962	Crossley, S.	Salesmen Are Prostitutes, *Sales Management*	deceitful, psychologically maladjusted, arrogant and overbearing, degrading and disgusting, repulsive, prostitutes (sell all their values for money)	1,000
1987	Weeks, W.A. and Muehling, D.D.	Student Perceptions of Personal Selling, *Industrial Marketing Management*	friendly, outgoing personality, pushy, obnoxious, sometimes offensive	300
1995	Babin, B.B., Boles, J.S., and Darden, W.R.	Salesperson Stereotypes, Consumer Emotions, and Their Impact on Information Processing, *Journal of the Academy of Marketing Science*	smiling constantly, walking quickly, smoking, being overweight, having thinning hair, dressing unstylishly, speaking loudly, shaking hands, lying	47
2007	Lee, N, Sandfield, A., and Dhaliwal, B.	An empirical study of salesperson stereotypes amongst UK students and their implications for recruitment, *Journal of Marketing Management*	expensive suit, forceful, fast-talking, overpowering, pushy, persistent, a nuisance, knowledgeable about products	60

* Associated characteristics or traits of salespeople reported in the literature based on empirical studies that employed a word association research method.

relationship and consultative selling practices, with few companies practicing "traditional" modes of selling (Lee et al., 2007). Specifically, modern sales professions emphasize long-term customer/client relationship building based on mutual trust in lieu of manipulative techniques to close deals quickly and reach sales quotas. The daily routines of today's salespeople in the United States involve using CRM programs to identify sales leads and prospective customers from databases, nurture relationships, and carry out post-sales activities. In fact, cold-calling to random phone numbers and door-to-door visits to unknown households have become uncommon practice in most industries (Fogel et al., 2012). Those changes in sales principles and technologies have been bolstered by academia's decade-long efforts to dispel negative perceptions. A plethora of published literature highlights the benefits of formal sales education, featuring various classroom techniques and educational outcomes aimed at improving perceptions of sales careers (Cummins, Nielson, Peltier, and Deeter-Schmelz, 2020; Spiller, Kim, and Aitken, 2020). Alongside these shifts in sales practices and education, it is worth exploring specific groups and individuals who may hold different perspectives on sales careers to gain insight for more efficient recruitment of sales talent. For instance, some students perceived sales professions to be high-pay jobs, so it may become more attractive occupations for them especially preferring performance-driven compensation (Johnson, Downey, Litzenberg, Wysocki, and Yeager, 2017). However, most literature on the perception of sales has either focused on analyzing the overall views of the student body without considering group differences or examined the causal effects of specific interventions, such as pedagogical techniques, on changing perceptions. A few exceptions include a study indicating that Australasian students find sales to be an "exciting" career and another showing that MBA students are willing to accept sales positions despite having mixed perceptions about it (Handly, Shanka, and Rabbanee, 2017; Pettijohn and Pettijohn, 2009).

METHODOLOGY

To investigate distinct patterns of sales perceptions among undergraduate business students and to identify potential differences among groups, a survey was conducted. We collected data from an AACSB-accredited business program with an enrollment of around 400 students in four different majors (accounting, finance, management, and marketing) at a mid-size university located in the southeastern United States. The survey was administered online to all business and pre-business students with a series of inquiries concerning students' perspectives on sales careers. The data were collected anonymously, and no compensation for participation, including extra credits in a class was provided. The

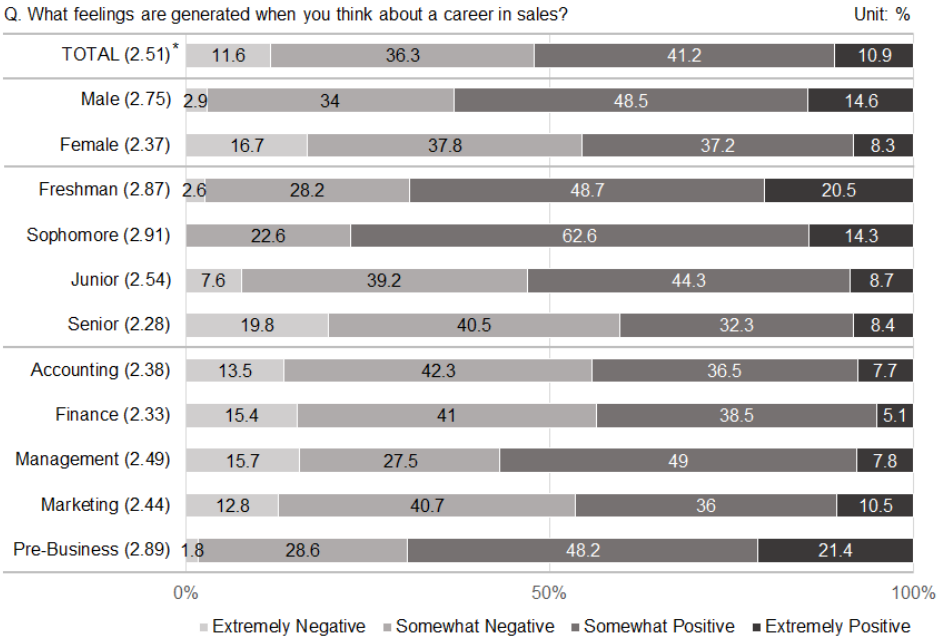
university did not offer any sales courses at the time of the study; thus, the survey participants have not had any exposure to sales education.

The survey garnered a total of 284 responses, with 180 females (63.6%) and 103 males (36.4%) completing it. Among these respondents, 56 were enrolled in the pre-business program, including 39 freshmen (13.7%) and 35 sophomores (12.3%). Within the business program, 79 juniors (27.8%) and 131 seniors (46.1%) took part in the survey. In terms of majors, among the 228 business students, 52 were in accounting (22.8%), 39 in finance (17.1%), 51 in management (22.4%), and 86 in marketing (37.7%). Because the survey participation was voluntary, there exists an uneven distribution across grade levels and majors within the sample. In this reason, instead of summing and averaging the total responses to generalize findings, we analyzed the data with more focus on identifying distinct patterns, and investigated differences of student segments based on gender, grade, and major.

FINDINGS

Interestingly, the survey results were not consistent with the commonly held notion in previous literature that perceptions of sales careers are predominantly negative. Instead, we found that student opinions about sales careers were largely mixed. Additionally, perceptions varied based on factors such as gender, grade level, and major. Notably, irrespective of their overall views, most business students across all groups agreed that taking a sales course would be a valuable addition to their business education.

Figure 1: Attitude Toward Sales Career



* The values in parentheses are the mean from the four-point scale anchored Extremely Positive (4) to Extremely Negative (1)

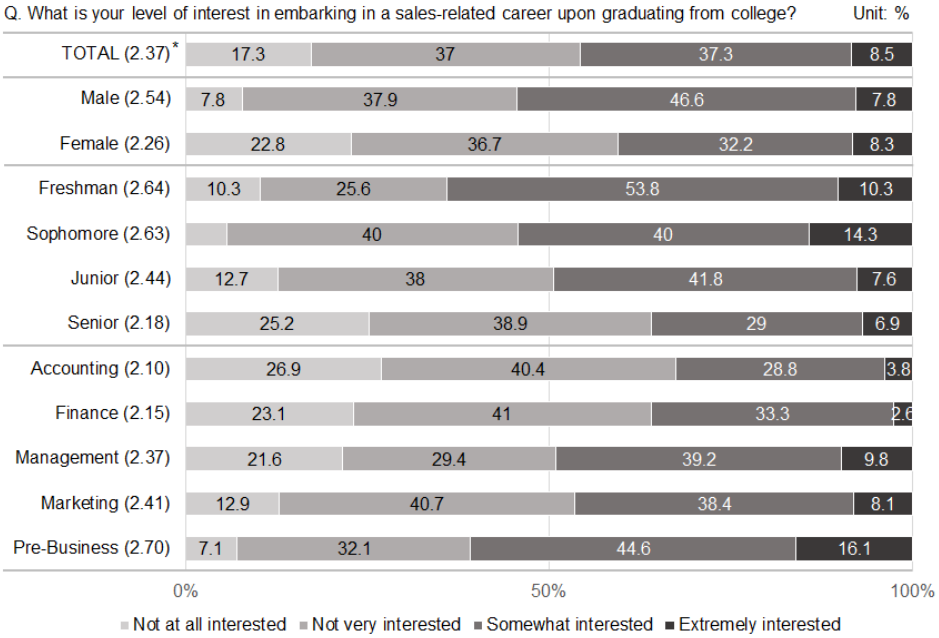
Attitude Toward Sales Career

In a question asking about student attitudes toward sales careers, approximately half of the respondents (52.1%) expressed positive feelings. It was noteworthy that extreme attitudes on either end of the spectrum were less frequent than moderate ones. Specifically, only 11.6% of respondents held extremely negative attitudes, and 10.9% had extremely positive attitudes, compared to 41.2% who were somewhat positive and 36.3% who were somewhat negative about sales careers. In terms of student segments, male students (63.1%) and pre-business students (69.6%) in either their freshman or sophomore years showed higher positive response rates. Regarding the academic majors in the business program, more management students (56.8%) revealed positive feelings toward sales careers than other majors. Figure 1 presents the distributions and mean scores of student attitudes towards sales careers by gender, academic year, and major.

Interest in a Sales Career

When questioned about their interest in pursuing a sales career after graduation, 17.3% of respondents indicated they had no interest at all, followed by 37% who said they were not very interested. However, nearly half of the respondents expressed some level of interest, with 37.3% stating they were somewhat interested and 8.5% indicating they were extremely interested in pursuing a career in sales after graduation. This varied by gender, with males expressing stronger interests (54.4%) than females (40.5%). It was noteworthy that the interest in a sales career decreased as they progressed toward graduation. In specific, 64.1% of freshmen, 54.3% of sophomores, 49.4% of juniors, and 35.9% of seniors answered they were either extremely or somewhat interested in embarking in a sales-related career upon graduating from college. Regarding the major, management (49 %) and marketing (46.5%) students were more interested in sales careers than accounting (33%) and finance (36 %) majors. Figure 2 presents the student interests in sales careers by gender, academic year, and major.

Figure 2: Interest in Sales Career



* The values in parentheses are the mean from the four-point scale anchored Extremely interested (4) to Not at all interested (1)

Perceived Value of a Sales Course

One of the key findings of the current survey was that a significant majority of business students (88.5%) believed that taking an academic course in personal and professional selling would be either extremely or somewhat valuable for their career preparation. This distinct pattern of valuing a sales course was consistent across all student segments examined in the study (see Figure 3 for detail). The group expressing the highest value for the sales course were management majors, of whom 94.3% considered the course to be valuable. On the other hand, the group with the lowest valuation was comprised of accounting majors, where only 69.2% viewed the academic course on sales as valuable. For this question, the differences between genders and grade levels were relatively minor.

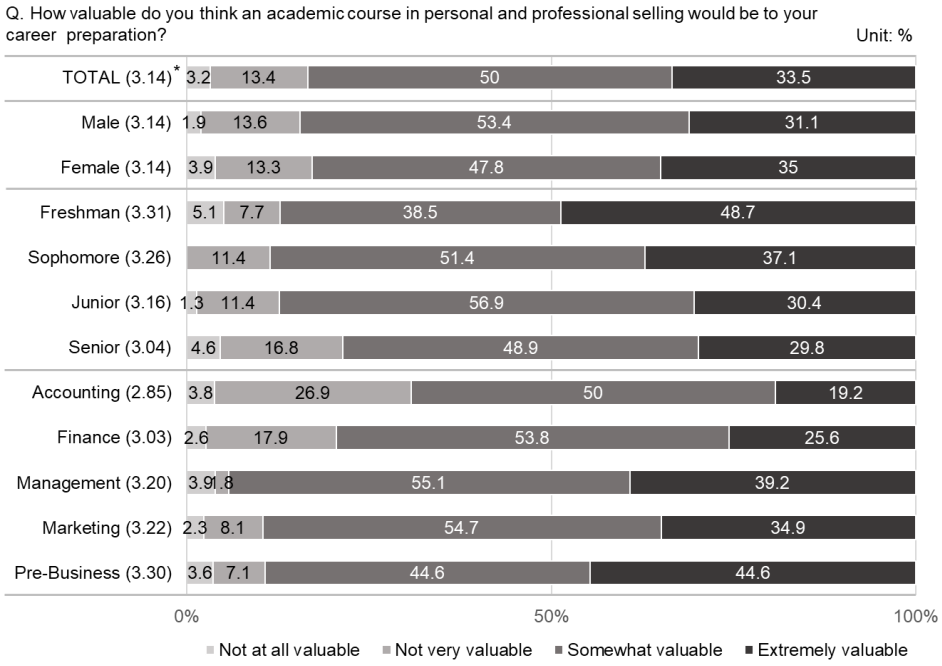
Career Interests of Marketing Students

The survey asked several additional questions to marketing students, including a question on their level of interest in enrolling in three hypothetical concentration tracks within the marketing program: Analytics and Research, Creative and Design, and Professional Sales. As Figure 4 presents, the findings revealed that undergraduate marketing students in this study are most highly interested in the creative track, followed by the sales track, and lastly, the analytics track. Interest in enrolling in the professional sales track of male (62.5%) and senior (62.2%) students were relatively higher than female (46.4%) and junior (53.6%) students.

DISCUSSION

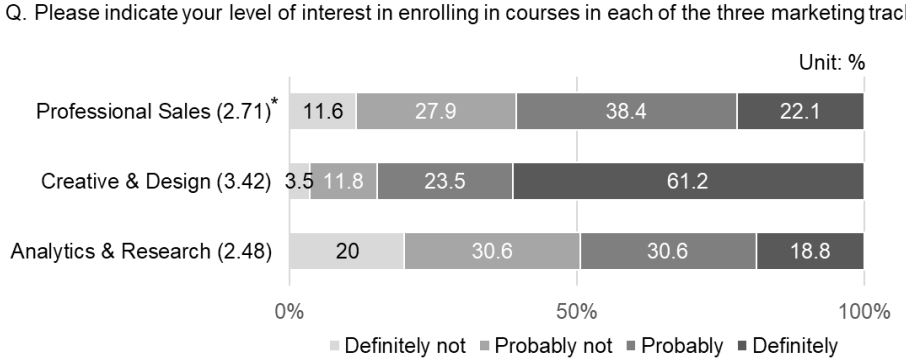
Previous research (Lee et al., 2007; Peltier, Cummins, Pomirleanu, Cross, and Simon, 2014; Inks and Avila, 2018) has found that college student interest in pursuing a career in sales falls behind industry demand, partly due to negative perceptions associated with the field. However, contrary to the conclusions of prior studies, the results of the present study showed that student perceptions toward careers in sales were not overwhelmingly negative across all student segments. Even more, positive perceptions prevailed among male students and pre-business students. The proportion of students with extremely negative attitudes did not exceed 20% in any of the segments surveyed. Additionally, a significant number of students expressed interest in pursuing sales careers after graduation. Among male students, pre-business students, management majors, and marketing majors, the proportion expressing interest in marketing careers either exceeded or came close to 50%. Especially among marketing students, a greater number chose sales as a possible concentration area over data-analytics that many universities have placed a higher priority on creating and promoting programs as opposed to sales education. The current survey was not designed to explain these unexpected patterns in student perception. These results might come from unique characteristics of the student

Figure 3: Perceived Value of Sales Course



* The values in parentheses are the mean from the four-point scale anchored Extremely valuable (4) to Not at all valuable (1)

Figure 4: Student Interest in Marketing Track Options



* The values in parentheses are the mean from the four-point scale anchored Definitely (4) to Definitely not (1)

population at the liberal arts university where the study was conducted, possibly where students have a higher aptitude for sales tasks involving significant interpersonal interactions. Alternatively, these findings could indicate the true shift in student perceptions of sales careers. For example, sales may now be viewed more positively as high-pay professions among Gen Z students prioritizes making money and having a successful career over getting married, having a family, and having time to pursue hobbies (Adamczyk, 2019).

In comparisons of student segments, several patterns consistent in multiple questions were observed. First, male students' responses toward sales career were more positive than female students. Findings in previous research were somewhat inconsistent regarding this gender difference. Some empirical studies also reporting males stating more interest in sales careers (Karakaya, Quigley, and Bingham, 2011; Inks and Avila, 2018) while others found no significant gender differences (Sojka et al., 2000; Ballestra, Cardinali, Palanga, and Pacelli, 2017). One explanation offered for the inconsistent responses by gender is that while males and females may have different inclinations toward a career in sales, these differences are not necessarily related to how favorable their overall perception of sales careers are (Sojka et al., 2000). A recent study of engineering students found that both male and female engineering students were equally interested in taking sales classes; however, males were more likely to actually enroll in sales classes (Scott and Beuk, 2020).

Secondly, regarding the academic majors, it was evident that responses from accounting and finance majors were more negative—or at least less positive—compared to those from management and marketing majors. This difference is not surprising, given the specific nature of tasks taught in the accounting and finance curricula. What was more notable, however, was that approximately 30% of accounting and finance students expressed interest in careers related to sales. It's conceivable that some students in these majors are not fully committed to a career path in accounting or finance and are open to exploring other options, including sales. Given their educational background, these students could represent a promising talent pool for sales positions in firms specializing in financial services, investment, and accounting consulting.

Third, another interesting finding from the current survey was the overwhelming positive perception of sales careers among pre-business students. In other words, negative perceptions increased over the academic years, leading to a decline in interest in sales careers. This finding was like a study (Scott and Beuk, 2020) with business and engineering students showing inverse correlations between year in school and interest in taking sales course. One possible explanation for this decline could be increased exposure to negative stereotypes about sales careers, either through personal experiences or social interactions with friends and family, especially during any talk about future careers. The other strong explanation can be that, as students' progress through their academic careers, they often become more focused on specialized paths, leaving little room for considering sales as a viable option.

Lastly, one area that displayed a consistent pattern across all segments was the perceived value of courses in personal and professional selling. Interestingly, many students who have little interest in pursuing a career in sales still see value in taking these courses to better prepare for their future professions. This suggests that most business students consider sales education to be an essential part of the business curriculum, irrespective of their personal interests or career plans.

Managerial Implications

The present study offers actionable insights for business programs examining a chance of developing or expanding sales curriculum. It highlights a significant interest in sales education among undergraduate business students, regardless of their academic year, major, or gender. Hence, should any business programs be reluctant to implement a sales curriculum out of worry over their students' potential negative views on sales, this study strongly encourages them to reconsider and actively pursue the establishment of a sales curriculum. Indeed, the recent increase in sales education offerings within U.S. colleges and universities is notable, ranging from majors and minors to certificates and specializations (DePaul University Center for Sales Leadership, 2015-2016). The Sales Education Foundation's 2021 Annual Report identifies 156 North American and 18 international universities providing sales education, reflecting a growing global interest (Sales Education Foundation, 2021). Furthermore, the membership expansion of the University Sales Center Alliance (USCA) from eight founding institutions in 2002 to 71 in 2023 underscores the increasing commitment to sales education of a group of university (Cummins, Peltier, Erffmeyer and Whalen, 2013; University Sales Center Alliance, 2023). This trend, coupled with high industry demand and student interest in sales courses, strongly supports the argument for the development and expansion of sales curricula in business programs.

In the development of sale curriculum in a business program, this study suggests incorporating sales courses at the beginning of a business student's university experience. The findings of this study align with those of Scott and Beuk (2020), indicating that freshmen and sophomores are generally less swayed by negative stereotypes associated with sales professions and are more receptive to considering a variety of career paths. Introducing freshmen and sophomores to the modern tools and techniques of contemporary sales practices can nurture their genuine interest and enhance their motivation to learn. This approach can effectively engage them before they encounter outdated sales methods that might foster negative perceptions. Practical steps to achieve this could craft an introductory sales course specifically designed for business-focused freshmen and sophomores. Inviting sales professionals as guest speakers for them also can enhance the effectiveness of such initiatives.

Although this study does not directly address the issue, it is worth briefly discussing another significant factor contributing to the scarcity of sales education in U.S. business schools. Unfortunately, there is a shortage of academically trained business professors in sales education, as only a few institutions offer terminal degrees in sales (Fogel et al., 2012). One effective way to address this gap is through collaborations between academia and the sales practitioners. Universities could partner with sales organizations to develop comprehensive sales curricula or even entire sales programs within business schools. However, such collaborations need not be large-scale projects. Smaller initiatives, such as guest lectures from sales practitioners in various business courses or meetings with student groups outside of the classroom, can also have a significant impact. Recent research by Nelson and Cummins (2019) found that a single high-quality in-class presentation by a sales representative could increase students' desire to work in the sales industry. Similarly, a study by Cummins and Peltier (2021) documented the positive influence that even a single interaction with sales professionals can have on college students' perceptions and intentions to pursue a sales career.

Limitations and Future Research

Sampling from a single university limits the ability to apply findings from the present study to other institutions. Especially for business programs at larger universities that place greater emphasis on academic research, student perceptions of sales careers may be more negative than what the current data suggests. Similarly, studies replicated at schools with established sales programs or sales centers could yield different results. Based on existing literature, it could be proposed that perceptions of sales careers would likely be even more positive at schools with formal sales programs compared to students in the current study, who had not taken any sales-related courses. Given the extensive research available on college students' perceptions of sales, a meta-analysis could serve as a timely method for advancing knowledge in this critical area.

This study identified several differences in sales career perceptions among various student segments without testing any casual effects on those differences. Future research could explore the underlying reasons for these differences between and within student segments. Specifically, it is crucial to understand why interest in sales careers tends to decline among juniors and seniors compared to freshmen and sophomores. Longitudinal studies that track changes in perception over time, as well as the factors contributing to these changes, would provide invaluable insights.

Finally, the current survey limited its focus to general perceptions of sales careers. However, given the diverse range of sales fields and job functions, student perceptions could vary widely depending on the specific industry or sales role. For example, an inside sales job in the financial sector may be perceived very differently from an outside sales position at an IT company. Therefore, further research into how perceptions vary by industry and job function could offer practical insights that would aid in the development of the focus in the sales program.

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Dr. Dae-Hee Kim is an associate professor of marketing in the Luter School of Business at Christopher Newport University. His research interests include marketing pedagogy, consumer psychology, and interactive marketing. His research studies were published in *Journal of Marketing Education, Marketing Education Review, Journal of Advertising Education,* and *Journal of Research in Interactive Marketing*.

Dr. Lisa Spiller is Distinguished Professor of Marketing, Emerita in the Joseph W. Luter, III School of Business at Christopher Newport University (CNU) in Newport News, Virginia. An inspiring teacher, mentor, advisor and role model to her students and junior faculty, Dr. Spiller had a profound impact on the lives of many during her 31-year career at CNU prior to her retirement in 2022. Dr. Spiller authored several college textbooks, including *Selling and Sales Management: Developing Skills for Success* and *Direct, Digital, and Data-Driven Marketing*, both published by SAGE. Her most recent book coauthored with Sylvia Weinstein Craft is *Platinum Rules for Enjoying Life*, published by Morgan James.

Data Analytics to Create Ballots for University Committee Elections

Jaideep T. Naidu, Thomas Jefferson University, Philadelphia, PA, USA

ABSTRACT

Service on University committees is typically required for full-time faculty members. One of the key tasks for members of the *College Committee on Governance* at Thomas Jefferson University is administering the nomination and election process for committees requiring election of faculty representatives. This is done during Spring semester of each year for the following academic year. Since committees have different eligibility criteria, it determines who qualifies to be on the ballot for each committee, as per the bylaws. Such ballots were created manually in the past. With almost 50 faculty members and eleven committees, the manual method is time consuming and prone to errors. Hence, the Governance Committee created an Excel based spreadsheet to finalize the ballot for each committee. This simplified the process and we now have an efficient system in place. The spreadsheet we created required practical applications of Excel formulas using AND, OR, and nested IF statements, along with conditional formatting. So, a version of this problem was used in an MBA class. The relatability of the problem resulted in active participation and engagement by the students with respect to a challenging learning objective for Excel learners.

Keywords: Spreadsheet modeling, Data Analytics, University Committee elections

INTRODUCTION

Tenure and promotion through the academic ranks are considered among the most honorable achievements for university faculty (Perna, 2001). In addition to teaching and research, faculty is expected to be involved in service related activities. Service activities of faculty that are considered for tenure and promotion are of three kinds. Serving on committees is considered internal to the university (Queenan and Nargundkar, 2023). The other kinds of (external) service are involvement in academic and professional organizations and service to the community. Faculty are expected to contribute to the advancement of the department, college, and the University. Thomas Jefferson University has always sought to strike a balance between protecting faculty from overextending themselves, thus impeding teaching and research, and encouraging faculty to contribute to the advancement of the University.

In terms of hierarchy, Jefferson's School of Business (SB) and the School of Design and Engineering (SDE) are part of the Kanbar College of Design, Engineering, and Commerce (KDEC). KDEC (and other colleges) is part of Thomas Jefferson University. At KDEC, we have ***six*** College level Committees requiring faculty representation from both schools i.e., SB and SDE. Additionally, we have ***six*** University level committees which require representation from all the colleges (KDEC being one of the colleges).

The Kanbar *College Committee on Governance* is composed of members of the college's faculty who completed their terms as the elected representatives on the college's Executive Committee. In other words, they roll over from the Executive Committee into the Governance committee. Thus, the Governance committee is the only committee where faculty serve without being formally elected by their colleagues. Also, they are not on any ballot during their entire term *and for an additional year after their term ends*. The rationale for this is that since they are directly involved with elections, there may be a conflict of interest to also be on the ballot for any committee.

The primary task of the Governance Committee is to administer the nomination and election process for committees requiring election of faculty representatives. The function of this committee is provided in Appendix–A (https://www.jefferson.edu/content/dam/academic/faculty-affairs/kanbar-supplement-handbook-032321.pdf). Ballots are prepared for each of these committees by including all eligible faculty members. Faculty are then notified of elections and given one week to campaign to their voting colleagues for the committee they prefer to serve on. All voting members are then given the following week to complete their online voting. At other institutions, this process varies. For example, the faculty at Western Connecticut State University are first surveyed for willingness to serve on various committees (https://www.wcsu.edu/faculty-handbook/university-governance/nomination-and-elections-committee-bylaws/). Note that at Jefferson, we accommodate and excuse faculty for not wanting to serve on a particular committee even when they get elected to serve on it. We believe this process is less time consuming as opposed to first surveying faculty willingness to serve on each committee and then preparing the ballots accordingly.

Since college students are familiar with elections in general and also familiar with the elections related to the Student Government at the University, we decided to discuss the faculty committee elections but used a smaller version of this problem to introduce them to AND, OR, and nested IF statements in Excel. Discussing real and practical problems with the objective of learning Excel formulas has become very important and commonplace. Classroom instruction is geared towards this style of teaching (Young 2022, Formby et al. 2017). Excel continues to be one of the primary tools for data analysis (Leong and Cheong, 2008). Because of its pervasive use in industry and management education (Patrick et al. 2019, Huggins et al. 2020), the use of real-life examples in the classroom is necessary and justified.

THE KDEC ELECTION PROCESS

As members of the KDEC *College Committee on Governance*, we recently complete two important steps related to committee elections.
Step 1. Identifying the committees that need elections and the number of elected faculty representatives needed for those committees; and
Step 2. Creating ballots based on the eligibility criteria of each of these committees.

Step 1 was completed by checking how many faculty representatives on each committee are completing their 1st, 2nd or nth terms in May 2024. This process took very little time.
Since KDEC has 50 faculty members, we knew from past experience that Step 2 is time consuming and prone to errors if done manually. So, we created an Excel spreadsheet to finalize our ballots. We adhered to the following set of guidelines to create the ballots, as per the bylaws.

- Each term is a 2-year term (see Exception below).
- Faculty can serve two consecutive terms (see Exception below) but must be re-elected to serve a 2nd term.
- Faculty completing their 1st term on a committee are also on the ballot for other committees (if eligible). For example, a junior faculty member may be available but not eligible to serve on the *Faculty Appointment, Tenure, and Promotion* (APT) committee (since only senior faculty must serve on it).
- Faculty may serve only on one committee (either College or University). This is in addition to school or department committees. However, school or departmental committees are typically formed by the Dean and hence not part of this discussion.

The following are some exceptions to some of the above guidelines.

Exception 1: Faculty can serve only 1 year on the *College Executive Committee*. At the end of their 1-year term, they roll over into the *College Committee on Governance* and hence not on the ballot for any committee at that time.

Exception 2: Faculty may serve more than two consecutive terms (if re-elected) on the *College Committee on Academic Outcomes Assessment*.

Exception 3: Faculty serving on the *College Committee on Governance* cannot run or serve on any other committee during their term(s). Also, they cannot be on the ballot for any committee for one year after their terms ends. We provided the rationale for this in the previous section.

We now present a coding method to reflect various possible scenarios for faculty. To explain our coding and generate the ballot, we use the *University Committee on Faculty Appointment, Promotion, and Tenure (APT)* as an example.

Creating a ballot for the University APT Committee
We provide a detailed explanation to prepare a ballot for the University Committee on Faculty Appointment, Promotion, and Tenure (APT). Based on the guidelines and exceptions, we first create codes to determine the ballot for this committee. Later, we show how an Excel formula can simplify this process. We use the following *coding* system to finalize the ballot for the APT Committee elections in Table 1. *Only senior and tenured faculty who will not be serving on any other committee during the following year are eligible to serve on this committee for up to a maximum of two terms.*

0 in column D of Table 1 indicates that the faculty member in the corresponding row is not currently serving on the APT Committee and hence will on the APT ballot (if eligible). Similarly, **0** in column F of Table 1 indicates that the faculty member in the corresponding row is not serving on any other committee and will be on the ballot for the APT committee (if eligible);

1 in column D indicates that the faculty member in the corresponding row is currently serving *and will serve next year too on the APT committee* and hence cannot be on any ballot. Similarly, **1** in column F indicates that the faculty member will be serving on another committee next year and cannot be on any ballot;

2 in column D indicates that the faculty member in the corresponding row is completing the 1st term this year and hence will be on the APT ballot for a possible 2nd term. Similarly, **2** in column F indicates that the faculty member will be on the APT ballot (if eligible). So, a **2** means faculty can serve on that committee again (if re-elected) and can also serve on other committees (if eligible);

3 in column D indicates that the faculty member in the corresponding row is completing the 2nd term this year and cannot be on the APT ballot. And **3** in column F indicates that the faculty member is completing a 2nd term this year on another committee and will be on the APT ballot (if eligible).

4 in column F indicates that the faculty member in the corresponding row is completing a term on the College Governance Committee this year and will not be on any ballot for one year (due to conflict of interest).

5 in column F indicates that the faculty member in the corresponding row is completing a term on the College Executive Committee this year and will roll over to serve on the College Governance Committee the following year and thus will not be on any ballot.

Note: Column G = Column D + Column F. Thus, if a cell in Column G = 0, then it is implied that the faculty in the corresponding row is not serving on any committees and thus can be on the ballots (if eligible).

To summarize:

0 in column G indicates the faculty in the corresponding row can be on committee ballots (if eligible);

1 in column G indicates the faculty in the corresponding row will not be on any ballot;

2 in column G indicates the faculty in the corresponding row will be on the ballot for the committee currently being served and also on other ballots (if eligible);

3 in column G indicates the faculty in the corresponding row will not be on the ballot for the committee currently being served (unless the committee allows serving more than two consecutive terms) but will be on other ballots (if eligible);

4 in column G indicates the faculty in the corresponding row will not be on any ballots this year; and

5 in column G indicates the faculty in the corresponding row will not be on any ballots this year.

We now look at all faculty listed in Table 1 to determine if they are eligible to be on the ballot for the APT elections.

TABLE 1: University Committee on Faculty Appointment, Promotion and Tenure (APT)

	A	B	C	D	E	F	G	H
1	NAME	Status	Tenured	APT Committee	On Ballot ?	Other Committee	SUM	COUNTIF
2	Dr. Bergman	Senior		0	No	0	0	2
3	Dr. Bogart	Senior	Tenured	0	YES	0	0	2
4	Dr. Brando	Senior	Tenured	1	No	0	1	1
5	Dr. Chaplin	Senior	Tenured	0	No	1	1	1
6	Dr. Grant	Senior	Tenured	2	YES	0	2	1
7	Dr. Hepburn	Senior	Tenured	0	YES	2	2	1
8	Dr. Peck	Senior	Tenured	3	No	0	3	1
9	Dr. Poitier	Senior	Tenured	0	YES	3	3	1
10	Dr. Streep	Senior	Tenured	0	No	4	4	1
11	Dr. Taylor	Senior	Tenured	0	No	5	5	1

Table 1 lists all senior faculty at the School of Business. We now determine who is eligible to be on the APT ballot.

Dr. Bergman is senior faculty but not tenured (she is on renewable contract) and hence not eligible to be on the ballot.
Dr. Bogart is senior faculty and tenured. Also, the 0 in cell G3 indicates he is available and thus will be on the ballot.
Dr. Brando is senior faculty and tenured. However, since cell G4 = 1, he will not be on the ballot.
Dr. Chaplin is senior faculty and tenured. However, since cell G5 = 1, he will not be on the ballot.
Dr. Grant is senior faculty and tenured. Since cell G6 = 2 (& D6=2), he will be on the ballot for a possible 2nd term.
Dr. Hepburn is senior faculty and tenured. Since cell G7 = 2, she will be on the APT ballot.
Dr. Peck is senior faculty and tenured. However, since cell G8 = 3 (& D8 = 3), he will not be on the APT ballot (as faculty can serve up to a maximum of two terms on the APT Committee).
Dr. Poitier is senior faculty and tenured. Since cell G9 = 3 (but since D9 = 0), he will be on the APT ballot.
Dr. Streep is senior faculty and tenured. However, since cell G10 = 4, she cannot be on any ballot at this time due to conflict of interest.
Dr. Taylor is senior faculty and tenured. However, since cell G11 = 5, she will roll over into the Governance Committee next year and thus cannot be on any ballot.
To conclude, the ballot for APT elections will consist of Dr. Bogart, Dr. Grant, Dr. Hepburn, and Dr. Poitier.

Since this example is a mini version of the actual problem, the above method of manual determination of the ballot was quick. Our students also found this example and related discussion interesting. However, KDEC has 50 faculty and eleven committees. Larger universities may have hundreds of faculty members and several more committees and a manual method is cumbersome and error prone, to say the least. Hence, we prepared spreadsheets and wrote Excel formulas to generate ballots for each committee this year. The following Excel formula entered in cell E2 and copied all the way down to cell E11 generates the APT ballot as seen in column E of Table 1.

=IF(AND(C2="Tenured",D2<>3,OR(D2=2,G2=0,G2=2,G2=3)),"YES","No")

If Table 1 also had faculty who are not senior faculty, then the Excel formula would include another condition as given below.

=IF(AND(B2="Senior",C2="Tenured",D2<>3,OR(D2=2,G2=0,G2=2,G2=3)),"YES","No")

We also used conditional formatting for column E so that cells that print "**YES"** have a light fill to make them stand out. We discuss the purpose of column H (Table 1) in the next section.

As evident in this example, writing appropriate Excel formulas requires a careful review of the eligibility criteria of the committee. We present two additional committees along with their eligibility criteria in Appendix – B. This can be given to the students as extra credit Exercises for writing appropriate Excel formulas to generate the ballots.

MAINTAINING THE SPREADSHEET

Maintaining the Excel spreadsheet and updating it each year with current information about all faculty members is another important and critical task of the Governance Committee. Otherwise, the ballots created by our proposed spreadsheet will not be accurate. This is true even in the case of the manual method. For example, a faculty member may be retiring at the end of this academic year. So, that person's name may be removed from the spreadsheet when preparing the ballot for the following year. A faculty member may be promoted or tenured or may become a Program Director. So, the status of that faculty must be updated accordingly. One must also keep track of newly recruited faculty. Inaccurate or incomplete data will result in an inaccurate ballot or as the computer science professionals say – *garbage in, garbage out.*

Manual errors or clerical errors are common. So, a thorough check of raw data is critical. Currently, we are also maintaining a word document where each committee lists the KDEC faculty serving on it. Furthermore, it states if faculty are serving their 1st term or 2nd term and also when their terms end (as shown below).

University Committee on Student Affairs
Dr. Rodgers (May 2025) – 2nd term
Dr. Hammerstein (May 2025) – 1st term

This means that neither of these faculty members must be on the ballot for any committee if this is Spring 2024 and ballots are created for the following year. Using our coding, we must enter **1** for both for this particular committee. If we enter **0** for one of them accidentally, then that faculty will end up being on the ballot for all committees (if eligible) for which elections need to be held. So, the only way to avoid such errors is to go back and double check the word document before ballots are prepared. If there is no mismatch of information, one can be reasonably sure that the ballots are accurate. One year from now, this information about Dr. Rodgers and Dr. Hammerstein will be interpreted differently. Dr. Rodgers will complete his 2nd term and will not be on the ballot for this committee but will be on the ballot for other committees (if eligible). As for Dr. Hammerstein, he will be on this ballot and other ballots (if eligible). So, their codes will be **3** and **2** respectively next year when we again prepare the ballots for committee elections.

We now discuss column H of Table 1. This column counts the number of 0s for each faculty row (not including the SUM column). For Table 1, we used the formula **=COUNTIF(D2:F2,0)** for Dr. Bergman. This formula gave 2 as the result for Dr. Bergman indicating there are 0s for all committees. If it had given a value = 0, it would immediately become obvious that there is some clerical error. Note that a 0 in column H is possible only if both columns D and F have non-zero values. And having non-zero values in both columns of the same row implies that this particular faculty member is concurrently serving on two committees. Since faculty may serve only on one committee, we can conclude that there is a manual error made in that case. So, the COUNTIF function can be useful in terms of capturing such errors. However, not all errors may be tracked using Excel functions such as COUNTIF. To summarize, the committee must keep updating any new information that is available. This may mean adding new faculty or removing retiring faculty from the list. This also means keeping track of tenure, promotion or any other changes in faculty positions.

CONCLUSION

As members of the College Committee on Governance, our primary task is to administer the election process for committees requiring election of faculty representatives. We look into the eligibility criteria of each committee and then create a ballot that includes faculty who are eligible to serve on it. The manual approach is time consuming since we have 50 faculty and eleven committees. Therefore, we created a spreadsheet and wrote an Excel formula for each committee based on its eligibility criteria. This approach has been proven to be very efficient and we plan to maintain this spreadsheet and create ballots again next year for faculty positions that will again open up for various committees. Since this is an interesting problem, we discussed Table 1 in the classroom. Our MBA students could manually identify all faculty who were eligible to be on the ballot. They participated enthusiastically when we also reviewed the Excel portion of this exercise. This exercise took us only about 45 minutes to discuss. Additionally, the two other exercises (Appendix – B) also provided a practical opportunity for students to learn one of the more challenging but useful applications of Excel. Since these were extra credit exercises, they did not particularly mind the challenge.

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Jaideep T. Naidu, Ph.D., is a Professor of Operations and Data Analytics at Thomas Jefferson University. He has published in peer reviewed journals that include *Omega, Journal of the Operational Research Society, Business Education Innovation Journal, AIMS International Journal of Management,* and *Journal of Applied Business and Economics.*

APPENDIX – A

College Committee on Governance

Function: The Committee on Governance shall oversee the membership of college-level standing and special committees as well as college representation to university-level committees, unless specified otherwise in the Bylaws.

The Committee on Governance shall administer the nomination and election process for those university and college-level committees requiring election of faculty representatives. In cases where appointment to university and college-level committees is required, the Committee on Governance shall appoint faculty to committees after consultation with the Dean. The Committee on Governance Kanbar College of Design, Commerce & Engineering Supplement to TJU Faculty Handbook shall ensure faculty proposed for election or appointment to university or college-level committees meet established requirements for said committee.

Upon a majority vote of any committee, the Committee on Governance may authorize the replacement of a committee member for absenteeism, failure to participate in the committee process, or other good cause shown, but a committee member shall not be replaced on the grounds that the committee disagrees with the committee member's position on issues before the committee. In the event the Committee on Governance authorizes such replacement, the committee member shall be replaced with a new member selected in the manner in which similarly situated members of the committee in question are typically selected.

The Committee on Governance shall announce election outcomes for committee assignments to the full faculty of the college. It shall maintain the official list of the college's representatives to university committees and college committees, per procedures outlined in the Faculty Handbook.

APPENDIX – B

Student Exercise 1. Create a ballot (Column F of Table 2) for the *College Committee on Academic Outcomes Assessment*.

Eligibility criteria: Any faculty member may serve on this committee. Tenure or seniority is not a requirement. However, faculty must have been with the University for more than three years. Also, faculty can serve more than two consecutive times on this committee. Faculty (who are also Program Directors) serve on this committee without being elected i.e., they must not be on the ballot for elections.
The instructor can walk through this example and manually prepare the ballot with the input of the students. The students must then be asked to write the appropriate Excel formula to generate the same results.

Student Exercise 2. Create a ballot (Column E of Table 3) for the *University Faculty Advisory Council*.

Eligibility criteria: Two faculty members from KDEC must serve on this University committee. One must be full-time faculty and female. The second member must be an adjunct faculty (either male or female).
The instructor can walk through this example and manually prepare the ballot with the input of the students. The students must then be asked to write the appropriate Excel formula to generate the same results.

Note: The eligibility criteria for the committees mentioned in the above Student Exercises 1 and 2 are not identical to what we have at our University. These are student exercises with the primary purpose of challenging them to write appropriate Excel formulas to create the ballots.

TABLE 2: College Committee on Academic Outcomes Assessment

	A	B	C	D	E	F	G	H
1	NAME	Status	Tenured	# of years	Outcome Ass.	On Ballot	Other Committee	SUM
2	Dr. Bacall			4	0	YES	0	0
3	Dr. Bergman	Senior		2	0	No	0	0
4	Dr. Bogart	Senior	Tenured	30	1	No	0	1
5	Dr. Brando	Senior	Tenured	25	0	No	1	1
6	Dr. Chaplin	Senior	Tenured	35	2	YES	0	2
7	Dr. Hepburn	Senior	Tenured	15	3	YES	0	3
8	Dr. Hitchcock			3	0	No	2	2
9	Dr. Peck	Senior	PD	20	0	No	3	3
10	Dr. Poitier	Senior	Tenured	25	0	No	4	4
11	Dr. Taylor	Senior	Tenured	18	0	No	5	5

The following Excel formula entered in cell F2 and then copied all the way down to cell F11 will generate the ballot for the College Committee on Academic Outcomes Assessment as seen in column F of Table 2 above.
=IF(AND(D2>3,C2<>"PD",OR(E2=2,E2=3,H2=0,H2=2,H2=3)),"YES","No")

TABLE 3: University Faculty Advisory Council

	A	B	C	D	E	F	G
1	NAME	Status	Male/Female	Outcome	On Ballot	Other Committee	SUM
2	Dr. Bacall	FT	Female	0	YES	0	0
3	Dr. Bergman	FT	Female	1	No	0	1
4	Dr. Bogart	FT	Male	0	No	0	0
5	Dr. Brando	FT	Male	0	No	2	2
6	Dr. Dietrich	Adjunct	Female	0	YES	2	2
7	Dr. Hepburn	FT	Female	3	No	0	3
8	Dr. Hitchcock	Adjunct	Male	0	YES	0	0
9	Dr. Peck	FT	Male	0	No	3	3
10	Dr. Poitier	FT	Male	0	No	4	4
11	Dr. Taylor	FT	Female	0	No	5	5

The following Excel formula entered in cell E2 and then copied all the way down to cell E11 will generate the ballot for the University Faculty Advisory Council as seen in column E of Table 3 above.

=IF(AND(B2="FT", C2="Female", D2<>3, OR(D2=2, G2=0, G2=2, G2=3)), "YES", IF(AND(B2="Adjunct", D2<>3, OR(D2=2, G2=0, G2=2, G2=3)), "YES", "No"))

Unique Approaches to Upper-Level Writing Skill Support: Student Use and Perceptions of a Business Writing Program

Ashly B. Smith, Sam Houston State University – Huntsville, Texas, USA
Lindsay C. Clark, Sam Houston State University – Huntsville, Texas, USA

ABSTRACT

Effective communication is named as a key goal for business graduates by many business colleges, professional business education organizations, and the accreditation organization Association to Advance Collegiate Schools of Business (AACSB). Still, several studies have reported increasing deficiencies in recent graduates' workplace communication skills, emphasizing the importance of exploring best practices for building students' communication abilities (Addams & Allred, 2015; National Association of Colleges and Employers [NACE], 2018). This study discusses an embedded grader support program and investigates students' perceptions and use of the feedback received on their business writing assignments. The results from a Qualtrics survey completed by 79 upper-level undergraduate and graduate students indicate that respondents find this type of writing support valuable; however, the responses identify issues with students' ability to access, understand, and use the resources and grader's feedback. We offer recommendations for improving the implementation and feedback protocols for similar writing skill programs.

Keywords: Writing skill development, Embedded grader, Writing support program design, Writing in the disciplines, Business writing

INTRODUCTION

Effective communication is widely regarded as an essential skill set for employees and a key competency sought by employers (Gray, 2022). Effective communication is also named as a key goal for business graduates by many business colleges, professional business education organizations, and the accreditation organization Association to Advance Collegiate Schools of Business (AACSB) (AACSB International, 2018; National Business Education Association [NBEA], 2020; Partnership, 2008). Additionally, several studies have reported increasing deficiencies in recent graduates' workplace communication skills, emphasizing the importance of exploring best practices for building students' communication abilities (Addams & Allred, 2015; National Association of Colleges and Employers [NACE], 2018). These findings place pressure on colleges of business aiming to prepare students to be effective communicators in various professional industries.

In the following sections, we offer a brief overview of writing skills support programs, particularly in disciplinary courses, and discuss an innovative embedded writing grader program offered in the business college at one regional university in the South. Then, students' self-reported use and perceptions of the program are summarized. Finally, we offer suggestions for the improvement, use, and development of this unique support program aimed at improving business students' written communication skills.

WRITING SKILLS SUPPORT PROGRAM APPROACHES

When assigning writing projects in disciplinary courses, faculty may seek options to provide supplementary support resources for their students. These options could include promoting the use of the university's writing centers, partnering with embedded course tutors (Carpenter et al., 2014), assigning writing fellows to specific classes (Bleakney et al., 2020), or developing discipline-based writing centers and programs (Betts & McCarthy, 2010; Morrison, 2016). Often, students strengthen their writing skills by using such support resources (e.g., Austin et al., 2018; Caldwell & Al-Ajmi, 2018). For example, Bleakney et al.'s (2020) survey on student and faculty perspectives of embedded writing consultants found that students valued having guidance through the writing process and felt their writing skills and critical thinking improved, with faculty also noting improvement in student writing.

For business schools specifically, several articles have reported successful iterations of discipline-specific writing support, including in-house business writing centers (Valentine, 1999; Betts & McCarthy, 2012) and dedicated writing consultants trained in business genres (Mackiewicz, 2012). These studies highlight the benefits for both student skill development and faculty who may feel challenged by integrating writing instruction along with disciplinary content

into their courses. The findings also suggest that one benefit of such targeted feedback is a reduction in grading time and student error-making. However, students typically must use these support resources prior to the submission of their assignments, and working with these resources may require significant additional time from the student, especially if they must meet synchronously with a tutor.

Another model for writing support in disciplinary courses is the use of an embedded grader that focuses on providing feedback only or primarily about the writing efficacy in student submissions (Clark et al., 2020). Unlike an embedded tutor that typically takes a developmental approach prior to submission, the embedded grader provides feedback after a student submits their work. A similar program, called the Writing Initiative (WI), was developed by leadership in the authors' business college to encourage faculty to include writing assignments and thus support students' writing skills.

After an internal assessment of 352 business majors' writing samples identified grammar, mechanics, and punctuation errors as the most common issues (Sigmar & Hynes, 2012), a writing errors handout called the "Credibility Killers" was created to support students' writing skill development (See Appendix A) (O'Neill, 2018; Sigmar & Austin, 2013, 2015). The handout was intended for classroom use, to help students to understand better the ten most common errors identified in O'Neill's (2018) research. Recognizing the popularity of that resource, the college leadership adopted the handout to be used as the rubric for the Writing Initiative. Though the business communication faculty were not involved in the development of the program, through our writing-enhanced courses and assessment service commitments, we assist the dean's office with evaluating student writing performance and relevant support initiatives. As such, our research goals focus on programmatic improvements that might benefit both faculty and student participants.

When faculty participate in the program, the WI grader is embedded in the course's learning management system (LMS) site and provides feedback on the students' submissions. The grader feedback consists of mainly in-line comments that include a letter that matches a corresponding rule on the Credibility Killers handout. The grader also provides a quantity-based comment indicating the number of major and minor errors, and they leave additional comments at their discretion. These additional comments often address rules not included on the Credibility Killers handout or offer more holistic feedback on the student's writing.

This feedback approach can be understood as a comprehensive and indirect corrective approach to writing feedback (Bitchener & Knoch, 2009; Cárcamo, 2020). This feedback style alerts students to the presence of an error and places the onus on the student to identify and address the issue, similar to Haswell's (1983) approach to minimal marking. Comparable approaches that both decrease grading burdens and encourage student engagement with revision processes have also been successfully used in writing and disciplinary courses (e.g., Haswell, 1983; O'Neill, 2018). Research on the use of corrective feedback for English-language learners shows that such feedback can improve the students' linguistic accuracy, particularly when revising an assignment based on feedback or engaging in some other kind of formal reflection (e.g., Hartshorn & Evans, 2015; Truscott & Hsu, 2008; Uscinski, 2017). Historically, there has been some debate about the efficacy of written corrective feedback on students' written work. Critics emphasize that although students' accuracy improves on a corrected assignment, the same errors often reappear with the same frequency in subsequent assignments, suggesting that students are not learning from the corrective feedback or are not transferring that learning (Truscott & Hsu, 2008). However, this feedback model was selected by the program developers because it enabled the college administration to provide some grading support to faculty while minimizing faculty's need to consult with or train an embedded grader for their specific assignment. In other words, developing the program with this feedback approach theoretically would allow the grader to easily and unobtrusively work with multiple professors, address the college's concerning communication assessment findings, and provide some writing skill feedback to upper-level business majors.

Providing corrective feedback to students *after* they submit their writing is a unique design (to the best of our knowledge) for a program intended to strengthen students' business writing skills. However, our program assessment suggests that it may be useful in improving students' writing skills. Recently, Clark et al. (2020) found that students participating in the WI were able to decrease their error frequency over four writing assignments, but the data was not able to indicate whether the Writing Initiative or other factors contributed to students' error-making trends. Thus, this type of post-submission writing support program may be useful for disciplinary faculty who want to encourage effective writing but do not feel prepared to incorporate much writing instruction or support prior to an assignment's submission. Overall, this innovative WI program addresses faculty concerns about added grading loads and their ability to provide effective writing skill feedback while also teaching disciplinary content. In turn, faculty are

theoretically more likely to use writing assignments which leads to students gaining more writing practice and improving their writing skills. However, the dean's office reports an approximate 10% faculty participation rate each semester, which prompted us to further investigate the program's design and impact. While the program may reduce the instructional and grading burden for faculty, questions remain about students' use and perceptions of such a program.

Due to the uniqueness of the WI, there is little research about similar programs. This study aims to gather more data on students' perceptions and use of the WI grader feedback. Student perception studies are useful in educational research because they provide guidance on students' engagement with educational content and resources and can inform programmatic adjustments. Prior research shows that students are likely to read and use the feedback they receive on their writing assignments (e.g., Cunningham, 2019; Higgins et al., 2002). Additionally, despite some scholars' concerns about corrective approaches (e.g., Truscott & Hsu, 2008), students seem to value comprehensive, direct, and corrective feedback on their writing skills, especially if that feedback provides guidance on how they can improve on future assignments (for more, see Paterson et al.'s 2020 systematic review of the topic). However, research regarding students' perceptions of writing skill feedback tends to focus on English-language learners in language-learning and developmental writing courses rather than native-speaking students in disciplinary courses. In this study, we surveyed students whose faculty used the embedded writing grader and asked students about their use and perceptions of the support program's resources and feedback.

STUDY AND PARTICIPANT DESCRIPTION

This IRB-approved study surveyed students who were enrolled in courses using the Writing Initiative (WI) in Fall 2021 semester about their perceptions of the program. All 455 students enrolled in courses using the WI during Fall 2021 were invited to complete the survey during finals week. Although this is a busy time for students, the survey was administered at this time because many participating faculty only used the WI on the final course assignment. Ultimately, using a survey provided an opportunity to gather composite information about students' use and perceptions of the program in a time-efficient manner.

Further, we wanted to ensure respondent anonymity to improve students' honesty when describing their use and perceptions about the program. Therefore, although students were invited to complete the Qualtrics survey through their university-affiliated email address, the students' emails were provided by the dean's office so that any influence from the students' faculty could be mitigated. Also, the student respondents' anonymity was ensured by disabling the Qualtrics setting to collect IP addresses.

To improve response rates, especially since the program is used in a limited number of business courses, additional measures were taken to incentivization participation and completion. First, upon completion of the initial survey, respondents could optionally enroll in a drawing for a $25 gift card using a secondary survey that was not linked to the initial survey. Second, following Qualtrics (2024) advice for improving completion rates, the Likert scale options were simplified to use a four-item scale of Agree, Neutral, Disagree, and Not Applicable, rather than the more common five-item scale plus an additional Not Applicable option. Although this choice limited the analysis options for the results, a prior attempt to collect this information from students failed due to an exceptionally low response rate (6%).

The goals of the survey included answering the following research questions (RQs):

1. Do students use the feedback provided by the WI grader?
2. Do students use the supporting "Credibility Killers" handout?
3. Do students perceive the WI program—including the handout and the feedback—as a valuable program?
4. Do students believe that the WI program—including the handout and the feedback—helps them understand and improve their business writing?

The primary survey included four (4) demographic questions about the respondent's age, identified gender, class ranking, and major. Then, respondents answered three (3) questions about whether and when they used the WI's resources and feedback. These questions were followed by nine (9) Likert scale prompts designed to gauge students' perceptions of the WI's usefulness, with the scale including Agree, Neutral, Disagree, and Not Applicable. This simplified four-item scale reduced respondents' need to determine the level of their (dis)agreement, and the Not Applicable option allowed them to respond to prompts even if they were not familiar with the aspect being referenced in a prompt. The survey ended with an optional open-ended prompt requesting any further feedback about the WI.

Seventy-nine (79) of 455 invited students completed the Qualtrics survey, a roughly 17% completion rate. Most respondents were upper-level, undergraduate students: 71% were seniors and 9% were juniors. The remaining 20% of respondents were graduate students. Eleven (11) undergraduate majors were represented, with most respondents majoring in Accounting (22%) and General Business Administration (15%). Forty-nine percent (49%) identified as male and 51% identified as female. Most respondents were aged 18-24 (62%) or 25-30 (19%); the remaining 19% of the respondents ranged in ages from 31-50.

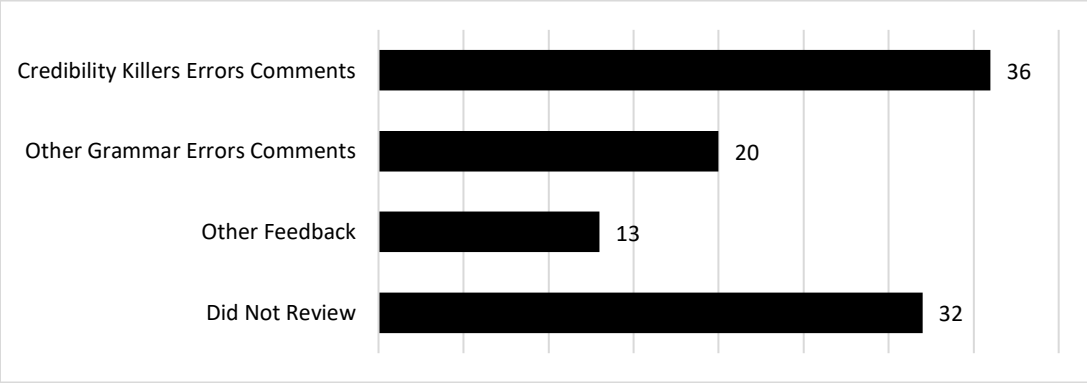
This study investigates students' use of the previously described WI program's handout and the embedded grader's feedback, as well as student's overall perceptions of the program's value for their writing skill development. The results offer insight into whether students value writing support programs that indirectly support their skill development and how they use the feedback, if at all. These findings can inform further development of the studied WI program and offer guidance for others interested in developing a similar support program.

RESPONDENTS' USE OF THE WRITING INITIATIVE'S HANDOUT AND FEEDBACK (RQS 1 & 2)

After responding to some basic demographic questions, students answered three questions about their use of the program's feedback and support handout, the Credibility Killers. Like students in other studies (Cunningham, 2019; Paterson et al., 2020), respondents in this study report that they do look at the feedback from the WI grader. In response to a multiple-answer question, 61% of respondents said they looked at the feedback when they received their grade, and 8% looked at it when preparing their next assignment. Nearly a third (31%) did not review their feedback. It is useful to know that most students are reading the feedback they receive on their assignments.

As noted earlier, in addition to the grader's feedback comments, the students have access to the Credibility Killers support handout. Most of the grader's comments include codes that match error types described on the Credibility Killers handout. Although this handout should be used to understand the grader's feedback, 53% of the respondents indicated that they did not use the Credibility Killers handout. About 46% of the respondents did look at the handout, with 30% reporting that they reviewed the resource before submitting their work and 16% reporting that they used the handout after receiving feedback. These results raise concerns since it is theoretically difficult to understand the grader's feedback if the students are not using the handout when reviewing the feedback.

Figure 1: Types of Received Feedback, shown by response percentage



Students also responded to a multiple-answer prompt in which they indicated the types of feedback they received from the grader. As shown in Figure 1, the most common type of feedback respondents received were comments related to errors on the Credibility Killers handout (36%), and the second most common type was comments related to other grammar errors (20%). When asked for clarification about the "Other Feedback" that was provided, students noted that they received only numbers indicating the quantity of "Major" and "Minor" errors in their submission, without additional notes from the grader. Survey respondents noted that they were unsure what this error quantity feedback meant and wished that more explanation was provided. Although the WI grader has previously explained to the authors that "major errors" refers to errors violating the Credibility Killers rules, and "minor errors" are anything else the grader identifies, it seems that the students are unaware of these distinctions.

When writing feedback uses an indirect corrective model in which errors are explicitly marked and little explanation

is provided, the research suggests that students need to have been previously provided explicit instruction about the expected rules (Hartshorn & Evans, 2015; Haswell, 2006; O'Neill, 2018). Further, this approach often works well when there are many assignments that are either low-stakes or that have revision opportunities (Haswell, 1983; O'Neill, 2018). The WI uses the indirect corrective feedback approach, but there is less structure in the program design to ensure students understand the provided feedback. Faculty are provided the Credibility Killers handout, but there is no guidance about how or at what point in the semester to incorporate the handout nor how to discuss the program with their students. There is also no guidance about how and to what extent students should be able access their feedback. Thus, there is likely significant variation in the faculty's implementation of the program and use of the handout. It is unclear whether 53% of the students did not look at the Credibility Killers handout due to student choice, student oversight, or simply lack of accessibility.

RESPONDENTS' PERCEPTIONS OF THE WRITING INITIATIVE (RQS 3 & 4)

Students also responded to a set of nine Likert scale prompts about the Writing Initiative (WI), with answer options including Agree, Neutral, Disagree, and Not Applicable. As discussed earlier, this shortened scale was used to improve survey completion rates, particularly since an earlier attempt to survey students received a remarkably low number of responses. This scale limits the analysis options, but the simple percentages described here offer insight into students' beliefs about and feelings toward the WI and its resources.

Students generally agreed that the WI resources and feedback were useful when available and that faculty should continue using the WI (See Table 1). A majority or plurality of respondents selected Agree for every prompt. No prompt received more than 14% disagreement from respondents. More than 50% of respondents agreed that the WI is useful for improving their writing skills (53%), motivating them to write more professionally (51%), and helping them identify aspects of their writing that could be improved (52%). These responses are promising because these results are precisely the kinds of goals that many instructors have when assigning writing.

Table 1: Students' Perceptions of the Writing Initiative (%)

		Agree	*Neutral*	*Disagree*	*N/A*
1.	Getting feedback through the WI helps students improve their writing skills.	53	23	5	18
2.	I was motivated to write more professionally because I knew the WI feedback would affect my grade.	51	19	14	16
3.	The WI feedback was easy to understand.	39	29	7	25
4.	The WI's common errors handout was easy to understand.	49	17	0	34
5.	The WI feedback helped me identify aspects of my writing that could be improved.	52	14	10	23
6.	The WI feedback improved my ability to edit my own writing.	47	21	13	19
7.	The feedback from the WI grader helped me better understand the features of effective business writing.	42	25	11	22
8.	The WI feedback prepared me to write more effectively in the future.	44	26	8	22
9.	Faculty should continue to use the WI so students can strengthen their writing skills.	52	26	9	13

Overall, students' responses to the perception prompts suggest that students who are engaging with the WI resources and feedback perceive the WI program as valuable, which affirmatively answers our third research question. However, while positive, responses to some prompts reflect potential shortcomings in whether the program's resources and feedback help students understand and improve their writing. Respondents' agreement levels were less than 50% for

prompts related to the clarity of the feedback and Credibility Killers resource and for prompts about students' ability to apply this feedback to their future writing.

The lowest agreement level, 39%, was in response to the prompt "The WI feedback was easy to understand." The prompt asking about the clarity of the Credibility Killers handout received 49% agreement. Although 52% of respondents agreed that the WI helped them identify aspects of their writing that could be improved, the lower agreement levels about the clarity of the feedback and handout seem contradictory.

Further, respondents indicated less than 50% agreement with prompt statements 6, 7, and 8. These prompts all ask students whether the WI feedback would help them be better business writers in the future, but students indicated less confidence in their future ability to edit their own writing (prompt 6), understand expectations of business writing (prompt 7), or just generally write more effectively (prompt 8). These response proportions, along with the previously mentioned results indicating that many students did not view their feedback or use the handout, raise many concerns about the extent to which the program can meet its goal of supporting students' writing skill development.

Complicating these concerning agreement levels, more than 20% of respondents indicated "Not Applicable" for five of the nine perception prompts. When responding to these prompts, students were instructed to mark "Not Applicable" if the statement did not apply to their experience with the Writing Initiative. As noted in the earlier program description, there are few requirements for faculty about how to implement the WI in their course. This flexibility is beneficial for faculty and may encourage faculty participation, but it results in a lot of variation in students' experiences with the WI. Students may have limited or no access to the Credibility Killers handout and/or their feedback. Faculty may or may not provide the handout to students, even though the feedback primarily refers to the handout. This potential lack of access is not ill-intentioned; anecdotally, some faculty use the WI grader only for the final assignment of the semester. In this case, the grader feedback is primarily intended for the instructor, and the students may have limited or no access. The reasoning behind this use of the WI by faculty is usually that it can motivate students to write effectively since the grader's feedback will affect students' grades. The belief that the program will motivate more correct writing seems to be well founded since 51% of the survey respondents agreed that they were motivated to write more professionally because they knew the feedback would affect their grades.

However, the variation in faculty's implementation of the WI, along with students' potential lack of engagement with the feedback and Credibility Killers handout, likely resulted in these notable "Not Applicable" results. Although this variation raises concerns about the generalizability of the survey results, we contend that the more important signal from these results is that it is difficult for the program to effectively meet its goals related to strengthening students' writing skills when there is so little consistency in the program's use.

Still, 52% of survey respondents agreed that faculty should continue using the WI so that students can strengthen their writing skills. Only 9% disagreed with the idea that faculty should use the program. When given the option to leave any further feedback, 10 students provided comments. Six of these students commented on the lack of availability or the lack of explanation in the WI feedback. Some of these comments were requesting more and clearer feedback, as shown in these samples:

- It would benefit students when we receive feedback to better understand what major and minor errors we made.
- The feedback needs to be in detail so students know what to correct for next time. Leaving a comment saying "___ major errors and ___ minor errors" did nothing for me.
- It would be helpful to have tips prior to writing a paper. Specifically, I would prefer resources on how to structure a research paper and what each area should contain.

The others noted that they did not receive the feedback or emphasized that being told the number of errors did not "help me improve without knowing what the errors are." These comments add insight into the students' lower levels of agreement for prompts about the clarity of the feedback and the Credibility Killers handout. Overall, they suggest that students would like this kind of support program if they received more detailed and accessible feedback.

STRENGTHS AND OPPORTUNITIES TO IMPROVE THE WRITING INITIATIVE

Prior informal conversations with the college administration indicate that the Writing Initiative (WI) was initially designed to support faculty's ability to include writing assignments in their courses. The faculty had expressed concerns about their ability to effectively give feedback on writing and on the tediousness of grading writing. Thus,

the initial purpose of the program was to alleviate faculty resistance to assigning writing, and a secondary benefit was developing students' professional writing skills. In some ways, the program does achieve these goals. As discussed in the previous section, students generally have positive perceptions of the WI, even if they have some frustrations. Further, in its current form, the WI is helpful: it provides faculty flexibility in their use of the program; supports faculty in integrating writing assignments; provides the grader easy access to student work through the institutional LMS and in-line grading tool; and seemingly helps students focus on error reduction when incorporated over multiple assignments (Clark et al., 2020). Still, these survey results identify potential areas for programmatic improvement.

As mentioned previously, the dean's office estimates that approximately 10% of the college faculty participate in the Writing Initiative each semester, a relatively low participation rate. Yet, across different perception prompts, the student respondents in this study agreed that the program is at least somewhat valuable to them, and, in their comments, they noted that they would like clearer feedback from the WI grader. Adjustments to the program could allow better support of students' writing skill development, such as more focus on guidelines for faculty implementation, improvement of the Credibility Killers handout, and guidelines for ensuring feedback is specific and accessible to students.

Provide Faculty with Implementation Guidelines

One way to strengthen the implementation of the WI would be to create more guidance for faculty about how to use the program in their courses. If the program is used, students should know that their work will be at least partially graded by an embedded grader, and they should be provided explicit access to the Credibility Killers handout. It would be helpful for faculty to provide physical and digital copies to students, when possible, and in online courses, make at least one prominent post about the WI and the handout.

Additionally, the variation in how this writing support program is implemented means that some students receive grader feedback once in a semester, some across multiple assignments, and some once but only for a final semester writing project. Guiding faculty on how to integrate writing support for several assignments throughout a semester could mitigate or reduce challenges related to students viewing and integrating their feedback and could also create opportunities for students to revise their work. This implementation approach could better strengthen students' writing skills given previous research findings that corrective feedback is most effective when paired with revision and/or reflection (Bitchener & Knoch, 2009; Hartshorn & Evans, 2015; Uscinski, 2017). Acknowledging that multiple assignments would add labor for the faculty member and grader, we suggest below additional modifications for streamlining and perhaps simplifying this writing support program.

Provide Grader with Feedback Guidelines

As previously described, the in-line comments left by the Writing Initiative (WI) grader include a letter code that matches a corresponding error on the Credibility Killers handout. For example, an in-line comment might read, "h. Misspelled word." In addition, the misspelled word may be highlighted, or the comment may simply be placed near the misspelled word. The expectation is that the student would see the coded comment and match it to the corresponding error on the Credibility Killers handout. This model is best described as an indirect, corrective model for providing students with writing feedback. As summarized earlier, prior findings from English language learning classrooms (Bitchener & Knoch, 2009; Hartshorn & Evans, 2015; Uscinski, 2017) and some upper-level disciplinary classrooms (Clark et al., 2020; O'Neill, 2018) suggest that repetitive corrective feedback coupled with revision and reflection opportunities can help students improve their grammar, spelling, and punctuation use.

However, we also know that the grader adds additional comments and explanations for errors not included on the handout. These additional comments raise some concern; Haswell's (1983) notion of minimal marking suggests the value of not saturating a student's writing with comments: "...it helps to avoid the mental dazzle of information overload" and helps them take ownership over editing their own writing (Haswell, 1983, p. 601). Marking all errors could lead to student overwhelm or disengagement with the feedback, so a more focused feedback approach could incentivize higher engagement with the correction process.

The students' low levels of agreement with prompts about the clarity of the grader's feedback (39%) and the Credibility Killers handout (49%) suggest that the current feedback strategy could be improved. It may be beneficial to collaborate with the grader to develop and limit the categories of feedback presented to the students. Perhaps that means that not all errors will be marked, allowing faculty members to provide additional explanations on specific errors in class or through the course LMS site. Additionally, because we encourage implementation guidelines to include more than one round of feedback from the grader, utilizing the LMS tools including building sets of comments

that can be easily dropped onto assignments would expedite the grader's process. These parameters would also ensure consistent feedback for all students, establishing expectations about the type of feedback they will receive and making the feedback more accessible.

Update the Credibility Killers Handout

Only 49% of respondents agreed that the handout was easy to understand, though we do not know exactly which aspects of the handout proved challenging for the students. Focusing the errors that are discussed and expanding the guidance around those errors could make the handout a more usable resource for students. Research on professionals' perceptions of specific writing errors suggests that some errors are more harmful to students' professional credibility and might warrant more attention (see Boettger & Moore, 2018; Gubala et al., 2020). These studies identify sentence fragments and run-on sentences as among the most frequent and bothersome according to survey respondents. With the research and our teaching experience in mind, we revised the Credibility Killers handout with two types of errors removed: errors that occur more often in oral communication and errors that rarely appear in our students' writing (Clark et al., 2020). The revised handout addresses only four types of errors: sentence fragments, run-on sentences, misspellings, and punctuation errors (See Appendix B). For example, to guide students on identifying and correcting sentence fragments, the handout includes the following explanation:

> *Error Example*: As a result of the Q4 earnings report.
>
> *Explanation*: The reader is left wondering, 'What happened as a result of the Q4 earnings report?' Not all the information is included to make this a complete sentence. A complete version of this sentence might look like this: As a result of the Q4 earnings report, the company leadership proposed a celebration.
>
> *Improvement Suggestion*: Check to make sure that your sentences are complete. Do they include a noun that is doing an action (a verb)? Is all the essential information included before the sentence's period?

This explanation introduces students to how they might identify and correct sentence fragments in their own future writing. Students may also benefit from having other resources about the Credibility Killers errors and other writing aspects. For example, one survey respondent specifically requested guidance on organization and structure.

The revised handout also includes additional resource links to the Purdue OWL with explanations on rules and common violations. The current handout (See Appendix A) includes external links to the Purdue OWL, but unfortunately, at the time of writing, those links do not work, so a regular review of the handout would be necessary if external resources were used. Additionally, internal resources like videos and slide decks could be posted on the course LMS site. Further revising the handout, perhaps with student input, and focusing the resource on bothersome error categories with additional explanations could make it easier to understand and improve the overall usability of the resource for both students and faculty.

Show Students How to Access All Feedback

Students may also need guidance about how to access the WI grader's feedback. Although 61% of respondents reported viewing their feedback, the survey respondents who left comments pointed out that they only received a note with the number of "major" and "minor" errors in their assignment, and no other feedback. However, the grader has told the authors previously that they leave in-line comments using the LMS comment tool. In our experience, some students only know how to view the overview comment for each assignment and do not know how to view the comments left on their submitted document. As found in other studies of students' engagement with instructors' feedback, students often need guidance on how to understand and use feedback (Uscinski, 2017; Weaver, 2006). Moreover, according to Laflen and Smith (2017), students tend to focus more on grades than feedback, so comments on the writing artifact are overlooked. Many LMS in-line grading systems show grades and feedback in separate areas, so this greatly decreases students' attention to writing feedback. Students would likely benefit from a video or text-based description of how to access the WI grader's feedback, with additional reinforcement provided in class.

These possible adjustments attempt to work within the program's initial design, in which the focus is mitigating faculty resistance to writing assignments with the secondary goal of strengthening student writing. Another option for improving the program would be redesigning it so that the primary goal is developing students' writing skills. A redesign of the program could take many forms but could include approaches like more interaction between graders or tutors and students (Carpenter et al., 2014), developing more student-focused and developmental feedback (Cunningham, 2019; Higgins et al., 2002; Paterson et al., 2020), or using other evidence-backed approaches depending on resource availability.

CONCLUSION

This innovative writing support program for business majors provides faculty with an embedded grader who identifies grammar and punctuation errors in students' writing assignments. The quantity of errors is reported to the faculty member, and in some cases, students have access to in-line comments and error totals provided as feedback from the grader. Most writing skill support programs are structured to assist students during their writing process (before assignment submission). In contrast, this program's creators believed that more writing experiences would inherently strengthen students' writing skills, and therefore, they designed the program with a "faculty first" mindset focused on facilitating the integration of writing assignments into disciplinary courses. This approach has been successful in some ways, yet there are also concerns about implementation and opportunities to strengthen the program.

Although the Writing Initiative uses the indirect, corrective model for providing feedback, the variation in the program's implementation across courses raises questions about whether the same kinds of gains seen in our preliminary program assessment results and previous research on this approach can be expected (Clark et al., 2020; Bitchener & Knoch, 2009). Notably, also, the survey results suggest that there are issues with students' ability to access, understand, and use the explanatory handout and the grader's feedback. Still, the overall positive agreement to the perception prompts indicates that students do value the program and would appreciate a more robust implementation of this type of writing support program.

Ultimately, though, this survey yielded a relatively low 17% completion rate, despite efforts to design a survey that would promote participation and completion. Therefore, the results point to possible areas of concern rather than strong generalizations. Further, the small completion rate and high demographic diversity of respondents reduce the ability to conduct more specific statistical comparisons. Even though respondents had the option to enter a drawing for a $25 gift card, given that this survey was emailed to students during finals week, the participating students are likely to be highly self-motivated and have strong opinions about their educational experience. Therefore, some response bias may affect these results, as well.

It is also difficult to gather generalizable information about students' perceptions of the program through an anonymous survey due to the variation in faculty's implementation of the program. Offering faculty flexibility in how they use the program is a strength from the administration and faculty perspectives, but it can create confusion, frustration, or even just ignorance for the students.

Nevertheless, questions remain that warrant further investigation of the WI's and similar program's impact on both student writing skills and faculty writing assignment integration. The authors, the Writing Initiative program administrators, and the business college's dean are explicitly committed to strengthening our business students' written communication skills. The Writing Initiative program could be improved to serve as an effective model for supporting business students' writing skills in their disciplinary business courses. Conducting interviews with students may offer a richer understanding of students' perceptions of the program and better indicate how students could more effectively engage with the program's resources and feedback when faculty use such a program. Given that faculty's use of the program is consistently low, we also plan to gather faculty perceptions of the program. Faculty who participate in the program could provide insight into their experiences with implementation and using the grader feedback; feedback from non-participating faculty may suggest ways the program could be adapted so that it could be more easily incorporated into their courses. Overall, more in-depth feedback from all stakeholders may reveal opportunities to strengthen the program and provide more meaningful support to improve students' writing skill development.

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AUTHOR BIOS

Ashly Bender Smith is an Associate Professor teaching business communication in the Department of Business Administration and Entrepreneurship at Sam Houston State University. Her research interests include writing-in-the-disciplines assessment, effective employment communication strategies, and pedagogical techniques for improving business students' communication skills.

Lindsay C. Clark is an Associate Professor teaching business communication in the Department of Business Administration and Entrepreneurship at Sam Houston State University. Her research interests include multimodal communication, genre theory and pedagogy, teaching writing in the disciplines, and communication assessment.

APPENDIX A: CREDIBILITY KILLERS HANDOUT

Credibility Killers: Ten Writing Errors Your Boss Hates to See

Credibility Killers	**Criteria**	**Examples**
Status Marking Errors	a. Nonstandard verb forms	*Had went* instead of *had gone*, *brung* instead of *brought*
	b. Lack of verb-subject agreement	*We was* instead of *we were*, *he don't* instead of *he doesn't*
	c. Double negatives	*He didn't have no money left after shopping.*
	d. Object pronoun as subject	*Him and Richard were the last ones hired.*
Serious Errors	e. Sentence fragments	*The company is prepared to raise prices. In spite of warnings.*
	f. Run-on sentences	*He concentrated on his job he never took vacations.*
	g. Non-capitalization of proper nouns	*I was last employed by texas instruments company.*
	h. Misspelled words	*When mangers make decisions, their often coping with deadlines.*
	i. Comma errors	
	● Clauses/phrases	*An employee no matter how good his record must perform well.*
	● Words/phrases in a series	*The museum bought a valuable old marble statue.*

Help with errors a, b, and c
https://owl.english.purdue.edu/owl/section/1/5/

Help with error d
https://owl.english.purdue.edu/owl/resource/595/1/

Help with errors e and f
https://owl.english.purdue.edu/owl/section/1/4/

Help with error g
https://owl.english.purdue.edu/owl/resource/592/01/

Help with error h
https://owl.english.purdue.edu/owl/resource/660/1/

Help with error i
https://owl.english.purdue.edu/owl/section/1/6/

APPENDIX B: REVISED CREDIBILITY KILLERS HANDOUT

Credibility Killers: Writing Errors Your Boss Hates to See

Errors with Examples and Resources
a. Sentence Fragments
Error Example: As a result of the Q4 earnings report. *Explanation*: The reader is left wondering, 'What happened as a result of the Q4 earnings report?' Not all the information is included to make this a complete sentence. A complete version of this sentence might look like this: As a result of the Q4 earnings report, the company leadership proposed a celebration. *Improvement Suggestion*: Check to make sure that your sentences are complete. Do they include a noun that is doing an action (a verb)? Is all the essential information included before the sentence's period? Resource link from the Purdue OWL
b. Run-on Sentences
Error Examples: • *Fused Sentence*: He concentrated on his job he never took vacations. • *Comma Splice*: He concentrated on his job, he never took vacations. *Explanation*: These examples included two phrases that could be independent complete sentences. A fused sentence combines them with no punctuation, and a comma splice connects them with only a comma. Both instances create run-on sentences. *Improvement Suggestion*: Place the correct punctuation between the two independent phrases, such a period or semi-colon. A comma may be used with a coordinating conjunction (For, And, Nor, But, Or, Yet, So). Resource link from the Purdue OWL
c. Misspellings and Illiteracies
Error Example: When mangers make decisions, their often coping with deadlines. *Explanation*: In this sentence, mangers should be managers, and their should be they're (or, they are). The first error is a misspelled word, and the second error is the use of a homophone (similar sounding word) instead of the correct word. Using the wrong word is referred to as an illiteracy. *Improvement Suggestion*: Take a break before editing your writing. Read your paper in reverse, sentence by sentence, to improve the chances of "catching" an error. Resource link for the Purdue OWL on proofreading for errors
d. Comma Errors
Error Examples: i. *Nonrestrictive clause*: An employee no matter how good his record must perform well. o *Corrected*: An employee, no matter how good his record, must perform well. ii. *Introductory phrase*: When your team meets next week set goals for completing the project. o *Corrected*: When your team meets next week, set goals for completing the project. iii. *Coordinating conjunction*: I am majoring in Accounting and I also plan to sit for the CPA exam. o *Corrected*: I am majoring in Accounting, and I also plan to sit for the CPA exam. iv. *Series of 3 or more*: You should read watch the video and review your notes for the exam tomorrow. o *Corrected*: You should read, watch the video, and review your notes for the exam tomorrow. Resource link from Purdue OWL for using commas

Redesigning Experiential Learning Opportunities for the Virtual Environment: Considerations for Online Business and Accounting Programs

Daniel Hebert, Syracuse University, New York, United States
Katie Matt, State University of New York Polytechnic Institute, New York, United States

ABSTRACT

Experiential learning activities function as a bridge between theoretical knowledge and practical application. A classic type of experiential learning activity, the internship, is a longstanding opportunity for students to apply theoretical course material to first-person, real-world situations. Traditionally, internships have been an on-site opportunity where students seek out organizations who are hiring interns and try to coordinate with their faculty advisor. Yet, with an increase in online course offerings, as well as online careers, there is a shift in academia toward including more experiential learning opportunities in an online format. To respond to this shift, internships must adapt to allow students these real-world opportunities that often lead to careers and allow for students to have the benefit of interning in the online environment. Further, faculty are incorporating other types of experiential learning into the classroom, and not limiting experiential learning to internships alone. This current article discusses the increase in online learning, the literature to support the need for various types of online experiential learning opportunities, and next steps that business schools can take to successfully administer online internships to meet the growing demand for online experiential learning opportunities.

Keywords: Online learning, Internships, Business Schools, Experiential Learning

INTRODUCTION

Online learning is an increasing platform for higher education. Many colleges are making the move to fully online programs. The flexibility online learning offers students is unmatched, but with this comes barriers to the educational experience. The initiatives we take in our physical classrooms to engage students in experiential learning must be redesigned in consideration of the virtual environment. Engaging students in this format can have additional constraints, as well as difficulties that differ from the on-campus setting. Yet, this also brings great opportunities. Fostering an online environment that is engaging students with real-world experiences can make the students feel as though they are actually in the classroom. Furthermore, faculty have various options for including experiential learning into the classroom, including but not limited to online internship opportunities.

Working with students who are not in the local area can bring constraints with industry partners, local community leaders and connections that the campus may have. Yet, this is where there is an important call for faculty to work with students in their respective areas. Faculty who engage with students and seek out experiential learning opportunities with corporate partners in their areas can bring not only learning experiences, but also networking experiences to the online classroom. There are also virtual opportunities for faculty to engage with corporate partners in their online classrooms. Faculty and students can work together with their connections in their areas to connect students with industry.

LITERATURE REVIEW

The literature is "replete" with research showing the benefits of experiential learning for undergraduate and graduate students (Penrod, McCorkle, and Harrell at 42). Experiential learning's efficacy has been shown to have a scientific basis. (Ibid). Here, cognitive scientists have shown that students who take an active role in the learning environment learn better than those who are not (Ibid). Experiential learning not only improves students' ability to retain material

being taught by faculty, but it also improves student motivation and increases students' willingness to participate during class lectures. (Ibid). Experiential learning should include activities in which professors ensure that student learning outcomes are being met, rather than being an alternate route to achieving them (Penrod, McCorkle, and Harrell at 43). Business schools can fashion certain experiential learning activities geared toward students studying business law (Ibid). These activities include contract simulation, mock trials, client interviews, and flipped classrooms. (Ibid). Further, these activities do not have to be offered at the expense of business students not interested in pursuing legal careers (Ibid at 40). Rather, these activities can provide all undergraduate business students with a "hands-on" view of the legal environment in which business operates. (Ibid at 40).

With the surge in adult learners and other post-traditional students entering college study, these students often choose online college degree programs that provide a high-quality learning experience without the need to be physically present on campus. (Nation, Reed, and Swank at 313). For universities offering online instruction, there is a challenge to provide the best education possible while maintaining student engagement. (Ibid). In business degree programs, adult students learn best when the learning experience is couched in a real-world context. (Ibid at 318). Therefore, effective experiential learning in business degree programs geared toward adult learners should be applied in nature, structured, inviting active student participation, be relevant to the business environment, and allow for learners to evaluate their learning experiences. (Ibid).

In the realm of online education, certain activities have been proven to be more effective than others in cultivating student engagement. (Black and Davidson, 157). With the advent of Zoom and similar online meeting platforms, faculty have been able to incorporate presentation and other speaking activities into their classes. (ibid). Faculty have also found success in inviting experts to participate in the course or by requiring students to contact experts individually and report back to the class detailing what they learned from interacting with an expert. (Ibid). Group exercises requiring student collaboration, including those structured to mirror the real-world tasks of employees in the workplace, have shown positive results when done in an online class environment. (Ibid). Simulation exercises have also shown promise on the online class realm. (Ibid). Providing remedial opportunities or extensions to submit late coursework have shown to heighten students' learning experiences. (Ibid). Further, engagement "with one's own self," known as reflective engagement, can also be incorporated into online education. (Ibid at 158). Last, it is important to note that AACSB requires schools offering online instruction to assess online student engagement to ensure equivalency with degree programs offered on-site. (Ibid).

The COVID-19 pandemic prevented students from engaging in internships typically offered on-site with the host organization. (Ratten at 5). In response, business educators began offering virtual internship courses as part of the degree curriculum. (Ibid). Virtual internships allowed students to engage with their internship supervisor through video conferencing platforms for feedback or questions, and to complete internship tasks remotely, thereby preserving the practical experience that one would attain in an on-site internship. (Ibid).

Researchers at the University of Wisconsin found that students who participated in online internships during the COVID-19 pandemic were less satisfied with those experiences than students who participated in in-person internships. Based on data collected from surveys and interviews with students, researchers found that the quality of task design, supervision, and communication are often deficient in online internships. (Hora, Lee, et al at v). The study also presented these findings: Online internship networking programs are crucial to connecting potential internship employers with students, though high student demand for online internships often exceeds the total amount of online internships available. (Hora at 55). Further, students who take part in online internships tend to be students with high grade point averages and be from upper-income backgrounds. (Hora at v). Thus online internships are not capturing a cross-section of college student populations. (Ibid). The study also found that the quality of online internships is inconsistent when compared to their in-person counterparts. (Hora at 56). Students who have participated in online internships report lower satisfaction with their experience versus in-person interns. (Ibid).

The researchers recommended that employers and academic institutions require training to improve how online internships are designed and implemented, with the goal of improving the quality of these experiential learning programs overall. The authors of the study also recommend experiential learning programs designed to require students to solve real-world problems, among other "21st Century Skills." (Hora at 26). Holistically, colleges and universities must work with internship employers to create the highest-quality learning experiences possible. (Hora at 56-57).

AACSB Support for Experiential Learning

With an increase in online business and accounting programs, comes a consideration of accreditation in these programs to ensure quality of learning and teaching. The Association to Advance Collegiate Schools of Business (AACSB) is the leading business and accounting school accreditors. The AACSB emphasizes the importance of experiential learning opportunities for students, incorporating this into their guiding principles and standards, as standard 4 curriculum, standard *4.3 "The school's curriculum promotes and fosters innovation, experiential learning, and a lifelong learning mindset. Program elements promoting positive societal impact are included within the curriculum"* (AACSB Guiding Principles and Standards, 2020, p. 41). Experiential learning is also defined by AACSB guiding principles and standards as "Experiential learning includes a wide variety of activities such as internships, service learning, study abroad, consulting projects, and other high-impact pedagogical practices" (AACSB Guiding Principles and Standards, 2020, p. 42).

Thus, this provides support for the importance of experiential learning opportunities in the online business and accounting classrooms. Not only does it provide meaningful and real-world opportunities to students, but it also provides networking opportunities and contributes to the assurance of learning for institutions. AACSB as a guiding body of quality of business and accounting education accrediting fully online undergraduate and graduate programs, including masters and doctoral level programs, intensifies the reality of necessity of navigating experiential learning opportunities for these students.

Incorporation of Experiential Learning at all Levels

It is important to understand differences in experiential learning for different levels of education. For example, experiential learning looks different for an undergraduate student versus a graduate masters student, as well as experiential learning for a graduate masters student should look different than that of a doctoral level student.

Undergraduate Students

Experiential learning at the undergraduate level is being able to take in brand new material and see this first-hand in action. This includes learning a new concept and seeing how this is applied to a real world example, including in industry. Many times in traditional, in-person coursework, industry professionals may make course visits and Professors facilitate guest speakers. This is an excellent way for students to connect with those in industry. Yet, the same experience must be facilitated for online students, to offer the valuable networking opportunities that on-campus students experience. There is opportunity for this, but the steps need to be taken to initiate a connection between faculty, industry leaders and the students. This may happen in the form of online class presentations, or team teaching between faculty and industry leaders, where industry leaders meet with students virtually to offer career guidance.

For example, a student in an introduction to business course would benefit from an entrepreneur coming to the classroom and discussing the steps to opening their own business, from a first-hand perspective. A student in a tax course could benefit from meeting virtually with a Certified Public Accountant during tax season, following along from beginning to end of a CPA preparing an individual's income tax. With online learning platforms and virtual meeting options, this can occur very easily, working around both the students and the CPA's schedule. This also allows the student to connect to CPAs near or far from their physical location. This allows the student to not only learn the concept in the classroom, but bring a real-world example to the class in the form of a current industry expert applying these concepts. Taking this a step further with online learning, utilizing the online platform in industry and making the connection through this platform can also be beneficial. Experiential learning can be done by connecting

with industry leaders virtually, in which students may not have been able to connect with these individuals within a physical classroom and a location as a barrier. The authors recommend that schools attempt to utilize the online platform for this purpose and endeavor to attempt it in the future.

Graduate Students

Graduate students should be taking the concepts they have learned a step further and being able to apply these concepts and expand further on them. Not only demonstrating an understanding of learning, but being able to apply this, themselves. This involves taking an idea and being able to make decisions, determining the optimal solution and presenting new ideas. Many times, graduate students work as graduate assistants on campus, connecting further with faculty and staff, hold internships in which they are able to work in an actual organization and connect with industry leaders, and also attend campus events to connect with organizations on campus. There is much potential for the same opportunities to be made available to online students.

Collaboration online can serve as a countless resource of connections and networking that a location bound classroom may not offer. Graduate students benefiting from not only experiential learning opportunities, virtually, but also networking with companies that they may have not had the opportunity to do so if they were bound by a physical location. This includes the opportunity for students to serve as graduate assistants in the online environment. Much work, such as research, grading, collaboration with faculty can be done in the online environment. In addition, graduate assistants can also help to organize virtual opportunities for students to network with industry leaders, which connects the opportunities to undergraduate students as well who are in the faculty's class. Faculty can collaborate with industry professionals to facilitate online internships, in which faculty help the industry professionals to engage with students in the online environment in a seamless way, such as having an organized internship program, which provides a platform to connect, as well as a way for the faculty and professionals to engage between each other and also the student. In addition, faculty working with other campus offices, including career services, to offer online graduate students opportunities to attend open houses virtually, to potentially connect with organizations and network. Here, the authors seek to increase student collaboration through virtual means as a college-wide program, though these programs have not been established yet.

Doctoral Students

Experiential learning for business and accounting doctoral level students should incorporate a level of experiential learning as a teacher. This is different from industry learning, in that doctoral students must apply their research areas to the classroom. Their career is aiming towards educating future business and accounting professionals; thus, they should experience hands-on teaching throughout their doctoral studies. It is proposed that doctoral students should be required to serve as teaching assistants in their second and third year of studies, and in their fourth year of study (ABD status) should be required to teach their own courses. This should be embedded into the doctoral program curriculum as experiential learning opportunities. Further discussion of doctoral student opportunities in the online world will be discussed in implications. Though the authors are not currently engaged in this type of doctoral-level instruction, they have worked as assistants while completing their own doctoral-level studies. As a result of the authors' experiences, they acknowledge the value of obtaining teaching experience while engaged in doctoral-level study.

PEDAGOGICAL IMPLICATIONS FOR BUSINESS SCHOOLS

Online Internships in the Curriculum

Incorporating online, credit-bearing internship opportunities into the curriculum can provide access to experiential learning to students who might not otherwise be able to pursue such opportunities. Integrating online internships into the curriculum can present challenges for schools and administering them takes a great deal of coordination between the school and internship employers. Although many degree programs have required courses that take up the credits

towards their degree program, considering allowing for credits built into the program is beneficial. To do so, programs must have partnerships with industry to ensure that students are able to have the opportunities to take on online internships. Another alternative is to incorporate internship opportunities in an existing online required course. In addition, internships can be a great way to indirectly measure learning and provide valuable feedback on learner assessment for programs. However, there is an imperative to maintain the academic rigor of the internship for the students despite not attending the internship on-site as originally planned. To maintain this rigor, faculty must adjust how online internships are administered relative to traditional, on-site internships.

One of the authors has successfully implemented online internships as part of an undergraduate curriculum. As a response to the COVID-19 pandemic, internships were cancelled if the work required by the internship employer could not be shifted to a remote format. As the school's internship coordinator, the author allowed students pursuing internships for academic credit to continue those internships if their respective internship employers were willing and able to shift the internship to a remote format. It must be noted that not all employers are able to offer internships in an online format. Some internships, simply by the nature of the work required, must be held on-site. However, the author sought to preserve as many internship opportunities as possible by working with employers and students to modify how internships are administered. Early on in this process, it became apparent that shifting internships to an online format presented new issues that had to be solved to make online internships feasible. These issues concerned employer supervision and performance evaluation, student engagement in the online format, and technological barriers.

The remote format of these internships necessitated regular remote supervision of students by their employers since regular face-to-face interactions were not possible. The author worked with the internship employers to ensure that the employers would provide the same level of supervision and communication that they would provide if students were working on-site. Internship employers must communicate with students about what the employers expect from their interns and to provide guidance throughout the internship. Here, the author contacted internship employers directly to request that they meet with student-interns at least weekly (by phone or virtually) to provide any guidance that students might need. Further, preserving regular interactions between internship supervisors and students was necessary to maintain the mentorship aspect of internships that students often seek when pursuing internships.

Regarding performance assessment and feedback, the author worked with employers to ensure that they would be able to provide meaningful performance assessment and feedback to students despite the lack of direct observation that would occur during an on-site internship. From the author's perspective, feedback about performance is particularly important because students must reflect upon this feedback as part of the experiential learning process, including regular reflection papers as well as a long-form culminating paper detailing the entire semester-long internship experience. Being mindful of employers' time and availability, the author encouraged employers to utilize their regular supervisory meetings as opportunities to also evaluate students' job performance and to provide feedback later. Employers favored this approach because it enabled them to accomplish their duties as internship employer more efficiently.

Another issue that arose concerned student engagement throughout the course of the internship. In the author's experience, working on-site and meeting with faculty on-campus will foster motivation and student engagement over the course of the semester. Further, working on-site can help to minimize distractions and keep students motivated complete their internships with maximum effort. Faculty involvement can is valuable in maintaining a high level of student engagement for internships held remotely. Here, it was helpful for the author to meet with students virtually on a weekly basis, rather than bi-weekly as was the norm for internships held on-site. In the author's experience, increased interaction with internship faculty helped to keep students focused on applying their internship experiences to what they have already learned in other courses, as well as to realize the import of experiences that they had while working at the internship.

Faculty must consider any technological considerations that employers require before approving an internship in an online format. Online internships, by their very nature, require students to communicate with employers and faculty virtually, either through online video or by phone. Further, employers might rely on specific technological platforms with minimum internet connectivity needs to which students may not have access. If students lack access to high-speed internet, employers may determine that offering a particular internship in an online format is infeasible. Faculty must urge internship employers to consider whether the student has the requisite knowledge of any specific technological platforms or tools they will require interns to use. In the author's experience, it is not practical to write any specific course policies which set minimum technological requirements. Rather, faculty should address any potential technological issues on a case-by-case basis when a student approaches the faculty member to express interest in an internship course while also considering the needs of the employer. Once that occurs, faculty should discuss any technological requirements with the prospective internship employer before the internship course begins to ensure that students who can comply with the employer's technological requirements are matched with those specific internships. If students accept internship offers but are then unable to meet the employer's requirements to complete the virtual internship work, then those students may resign from the internship consequently drop the internship course, which in-turn could negatively impact the student's overall degree-completion timeframe.

Overall, online internships can present valuable opportunities for students in online programs to engage in experiential learning. Even though the author's experiences discussed above detail moving on-site internships to a remote format, these considerations apply to online internships categorically and should be included when designing internship courses for online business program curricula.

Transforming Experiential Learning Opportunities

Faculty must focus on internships' assigned tasks, quality of supervision, and communication among the school, the student, and the internship supervisor with the goal of improving the experiential learning experience overall.

Business and Nonprofit Partners

The virtual collaboration of business and nonprofit partners with academic is critical in both providing experiential learning opportunities for students, as well as training the future leaders of industry. Understand and encourage experiential learning opportunities for students. Collaboration with business and nonprofit partners in the classroom will make the experiential learning experience an optimal learning opportunity. Bringing these partners to the classroom, which is flipped from a typical internship agreement, will help more students experience industry, first hand. Partners can work with students who are potential employees and students can learn first-hand from leaders in the industry, flipping the view of internships and providing real world engagements. As business faculty members, the authors acknowledge the value that this collaboration brings to the classroom learning experience.

Doctoral Students

Now, we advise that there be opportunities in meeting the teaching requirements of doctoral students. Such that, doctoral students can teach their own courses at their doctoral granting institution, if possible, however, if not possible, should be able to seek teaching opportunities at accredited institutions to meet this requirement as well. Requiring this would mean experiential learning opportunities at the doctoral level, preparing future educators for preparing future business and accounting industry leaders. The online platform allows doctoral students to connect with research leaders in their areas that may not have happened if location bound. This is critical in understanding the research in their respective areas and taking advantage of opportunities that the virtual environment has for them.

Faculty and Industry Partners

Faculty, as experts in their respective fields are well qualified and versed to teach their students. Through the use of real-world examples and applied learning experiences, faculty are able to bring concepts to life. Yet, there is an opportunity for faculty, students and also industry professionals to collaborate. Faculty-Industry team teaching follows the idea that the faculty create relationships with individuals in industry that are currently working in the field of the concepts that the faculty members are teaching. For example, a tax professor team teaching with an active CPA who is a partner in a CPA firm. The tax professor can teach the class the fundamentals of preparing tax forms, while the CPA can visit the class and give first-hand real time examples of applying this in their firm. Another example of this would be an entrepreneurship professor team teaching with a business owner, where the professor is able to teach how to take a concept and an idea and create a business from this and the business owner can visit the class and give first-hand real time examples of current issues in owning a business. This would allow students to not only have their Professor, as the expert to teach them the foundation and real-world examples, but also bring these real-world examples to life by having the industry professional visiting the classroom. This also allows for the opportunity for networking for students.

One benefit of the online classroom is that the professor is able to connect and team teach with industry partners from virtually any location. This can be of great advantage to the students as well, as they are not restricted in their area and can even leverage their connections in the virtual classroom. Whether the industry partner hosts a virtual session with the professor and the class, provides a recorded session, or participates in an online discussion, this would help to apply the knowledge the Professor presents to the class in real time.

NEXT STEPS FOR BUSINESS SCHOOLS RECOMMENDATIONS

The Future of Experiential Learning

The future of experiential learning will be expanding and evolving. Though the traditional, in-person internship will likely be a fixture in academic programs, other modes of experiential learning have developed to meet the needs of students in online degree programs and in response to the COVID-19 pandemic. The future of experiential learning in the online environment should consider several items to be successful, including analyzing current opportunities, benchmarking, prioritizing quality, creating a dedicated staff and taking the next steps.

Analyze their current opportunities

Business schools should assess what they are currently doing in the area of internships, and what has worked in the past and analyze what they are currently not doing as well. They should take what they are doing in their in-classroom internships, and adapt this to the online environment. In addition, they should consult with career services on industry partners to understand how they can quickly make networking connections with current industry partners of the institution.

Know what you do well and what you don't do well, Benchmark

Internship coordination, specifically in the online environment, is a critical role on campus. Hiring an internship coordinator is highly recommended to take on this role. This position will help to create a solid internship plan for students in the online classroom, while also leveraging the business network to create agreements in industry. This includes networking with industry partners to have consistent funnels of internships for online students, so they are not required to solely seek out online internships on their own.

Prioritize Quality When Administering Experiential Learning Programs

Experiential learning activities, be they internships, student interviews of industry experts, or in-class simulations, must emphasize reflective engagement. Specifically, these activities must culminate in students writing about their

experiences in detail. An effective reflection should require students to detail what the activity consisted of, what their tasks were, what they knew about the respective topic beforehand, what new information was learned during the activity, and how they will utilize this new information in the future. This is the crux of experiential learning: being able to apply what was learned during the experience in future, real-world situations.

Creating a Dedicated Staff Position to Administer Experiential Learning Programs

Colleges and universities should consider centralizing their experiential learning programs into one office. Here, a central office would be tasked with developing and sustaining partnerships between the school and potential internship employers, working with faculty to develop other experiential learning opportunities, facilitating experiential placements, monitoring experiential learning programs to verify that they are meeting accreditation standards, and writing internal policies to track student learning experiences for learning outcome and overall program assessment. This office could also maintain student handbooks for experiential learning courses. Handbooks, though they may not be required on the institutional level, can be useful in providing students with the necessary information about course grading policies, student responsibilities and expectations, employer and faculty responsibilities, as well as planning timelines to apply for and begin experiential placements. Centralizing these functions into a single office can streamline the administration of experiential learning programs and help to ensure that all parties involved in these programs (e.g. students, faculty, and placement locations) receive consistent communication about college-level policies. The authors do not have direct experience with a dedicated staff position such as this, however, it is recommended that colleges pursue this type of staff position, if possible, to gain the efficiencies and ensure consistency in experiential learning program administration that have been discussed. Further, the authors have direct experience with administering internships and acknowledge the value a dedicated staff position would add to program administration.

Take the next steps

The authors emphasize that the recommendations set forth in this article are intended to be workable and generally feasible for colleges to design and implement. Cultivating an online experiential learning environment that is regularly available for students, without barriers for students, is critical to its success. Reviewing current curriculum, understanding internship opportunities that have already been facilitated and working with industry partners can help to start redesigning the internship experience. Leveraging partners that you currently work with to jump start the online internship opportunities. Create an online internship guide that helps students work through the process with the internship coordinator, as well as the industry partner. For colleges interested in establishing formal experiential learning programs, colleges must ensure substantial collaboration among faculty, students, staff, and employers. Also, before a formal experiential learning program is launched, colleges are highly advised to formulate a thorough plan for how the proposed experiential learning program is to be administered, including writing any college-level policies that might be needed to establish the expectations for all parties involved in experiential learning programs, and to administer these programs on a consistent and ongoing basis.

CONCLUSION

This paper offers guidance on incorporating experiential learning opportunities in the online environment, with the consideration of program administration, quality, partnerships, and accreditation at the forefront. It is critical for business schools to continue with applied learning opportunities in this environment, so that students have opportunities that are easily missed in this modality. Not only do these opportunities provide practical experiences for students, they serve as networking opportunities and educational opportunities that are unmatched. Business schools need to be innovative and intentional in the online setting, while creating opportunities and partnerships to enhance the experiential learning opportunities.

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Integrating Business, Design, and Engineering: Challenges, Instructional Strategies, and Assessment in Undergraduate Business Education

Chae Mi Lim, Thomas Jefferson University, Pennsylvania, USA
Jason Crook, Thomas Jefferson University, Pennsylvania, USA

ABSTRACT

Interdisciplinary learning is crucial in preparing students for the complexities of the modern business landscape by blending knowledge from diverse fields to foster innovative solutions for emerging opportunities. However, incorporating this approach in the early years of higher education remains a challenge. Drawing from experience in integrating business, design, and engineering in an introductory undergraduate course, this study examines the associated challenges, instructional strategies, and assessment methods used. The paper aims to assist educators in enhancing interdisciplinary learning within undergraduate business education, emphasizing the critical role of early exposure to interdisciplinary practice in preparing students for their future careers.

Keywords: Interdisciplinary learning, business education, introductory, undergraduate, assessment, challenges, instructional strategies

INTRODUCTION

Interdisciplinary learning is essential in business education, equipping students to navigate the complexities of today's business world with innovative strategies (Razmak & Bélanger, 2016). This educational approach merges knowledge and skills from diverse fields, including business, design, and engineering, thereby enhancing students' ability to both identify business opportunities and develop innovative solutions. The integration of design thinking is crucial in developing solutions that are highly desirable to consumers. Meanwhile, the application of engineering and technological principles ensures these solutions are practically feasible. Additionally, leveraging insights from business models to evaluate market demand and financial viability anchors these innovations in a real-world context.

The world offers multiple notable examples of innovative business models developed through interdisciplinary collaboration with design and engineering. Apple's blend of technological innovation and user interface design to drive demand across their mobile device ecosystem, Tesla's cutting-edge technology innovation and sustainability combined with its direct sales business model, and Airbnb's integration of stacked technologies on a user-centric platform designed to appeal to consumer demands in a sharing economy, all illustrate the transformative power of interdisciplinary integration across industries.

Recognizing the importance of interdisciplinary learning, educational institutions are weaving it into their curricula. MIT's Integrated Design & Management program blends business, design, and engineering, fostering a balanced and integrated approach that has led to innovative business models and groundbreaking products (*MIT IDM – Integrated Design & Management*, 2023). Similarly, the University of Pennsylvania's Integrated Product Design, a graduate interdisciplinary program, unites business, design, and engineering within its design school (*IPD Programs – IPD: Integrated Product Design*, 2023). At the undergraduate level, Olin College of Engineering offers a unique Engineering Design program that merges design thinking with engineering principles (*Olin College of Engineering*, n.d.). Thomas Jefferson University also promotes interdisciplinary collaboration and learning at the undergraduate level by integrating business, design, and engineering disciplines within its curriculum (*DEC curriculum*, n.d.). This move towards a holistic educational strategy, characterized by the fusion of varied insights and methodologies, prepares students for the interdisciplinary collaboration and complex problem-solving they will face in their professional careers.

Exposing students to an interdisciplinary learning approach early in their educational journey equips them with essential skills such as a holistic perspective, creative problem-solving, teamwork, and an innovative mindset, crucial for navigating the rapidly evolving business landscape. However, integrating interdisciplinary learning in undergraduate courses, particularly at the introductory level, introduces unique challenges not present in graduate programs. Undergraduates often lack the foundational knowledge, critical thinking, and teamwork abilities that are

typically found in graduate students, complicating the application of interdisciplinary learning. Moreover, undergraduates' more limited life and professional experiences may hinder their problem-solving from diverse perspectives. Assessing interdisciplinary learning outcomes is also more challenging at this stage, as students are only starting to develop their interdisciplinary skills, unlike in graduate programs where more developed competencies can be assessed more directly.

Moreover, compared to implementing interdisciplinary learning on a narrow scale, which focuses on collaboration between closely related disciplines or sub-disciplines (Borrego & Newswander, 2010; Bullard et al., 2019; Costa, 2019; Oattawi et al., 2021), broad scale interdisciplinary learning, which incorporates a diverse array of disciplines into a comprehensive approach (Lim et al. 2012; Warr & West, 2020; Xu et al., 2022) such as combining business, design, and engineering faces additional challenges. These challenges stem from the need to overcome differences between disciplinary and scientific perspectives and methodologies, highlighting the complexity of bridging significantly different areas of study and synthesizing diverse perspectives (Spelt et al., 2009).

This paper shares insights from integrating business, design, and engineering into an introductory undergraduate course at a regional private university. The objectives of this paper are to: (1) examine the challenges of incorporating and assessing interdisciplinary learning in an introductory course environment; (2) introduce instructional strategies to address these challenges; and (3) outline the development of assessment tools for interdisciplinary learning outcomes. Through this analysis, this paper aims to provide educators with valuable insights into developing instructional strategies and assessing learning outcomes in undergraduate courses that incorporate interdisciplinary learning.

PREVIOUS RESEARCH ON INTERDISCIPLINARY LEARNING

Interdisciplinary learning focuses on integrating and synthesizing knowledge from various disciplines to address complex problems that cannot be effectively solved using a single disciplinary perspective (Costa et al., 2019; Jacob, 2015: Klein, 1990). This approach is in contrast to the multidisciplinary method, which is more additive and less integrative, often leading to a weaker combination of insights from various fields (Borrego & Newswander, 2010; Spelt, 2009). The essence of interdisciplinarity lies in its commitment to creating new knowledge and solutions through the deep integration of disciplinary perspectives.

As interdisciplinary learning becomes increasingly valued in higher education, colleges, and universities are increasingly incorporating this approach into their coursework and programs (Brassler & Dettmers, 2017; Chettiparamb, 2011; Jacob, 2015; Khadri, 2014; Spelt et al., 2015). This strategy is typically implemented on a narrow scale, emphasizing collaboration between closely related disciplines or sub-disciplines to address specific problems. For instance, the combination of mathematics, science, and technology (Costa & Domingos, 2022), collaboration between mathematics and engineering (Costa et al., 2019), synergy between science and engineering (Borrego & Newswander, 2010), integration across various medical sub-disciplines (Bullard et al., 2019), and the collaboration among different engineering specialties (Oattawi et al., 2021) exemplify this approach. This strategy enhances problem-solving capabilities and innovation by leveraging the complementary strengths of closely related disciplines through the synergistic sharing of methodologies, theories, or concepts.

On the other hand, interdisciplinary learning can also unfold on a broad scale, aiming to integrate disciplines with significant differences in knowledge bases, tools, cognitive frameworks, and methodological approaches into a unified strategy. This approach can encompass varied combinations such as marketing and environmental studies (Wiese & Sherman, 2011), marketing, merchandising, industry management, fashion and graphic design (Lim et al., 2012), and the integration of business, design, and engineering (Xu et al., 2022). Curricula designed to cultivate broad scale interdisciplinary learning often face more challenges than those focusing on a narrow scale (Spelt et al., 2009). The challenge primarily lies in bridging vastly different fields of study, requiring educators and students to synthesize a wide range of perspectives and methods. Despite these challenges, the broad scale interdisciplinary approach aims to equip students with holistic understanding and versatile problem-solving skills.

Broad scale interdisciplinary learning encompasses various approaches, including project-based collaborations that bring together students from diverse disciplines to tackle specific interdisciplinary projects, and integrative methods that facilitate collaboration among students from different fields within a single course setting. This method is applicable across educational levels, catering to both early-year students and senior-level capstone courses.

Project-based interdisciplinary collaborations, involving multiple classes enable students to apply and integrate their specialized knowledge into broader, more complex projects. These projects mirror the multidisciplinary teams found in real-world work environments, fostering insights into cross-disciplinary synergy, project management, and team dynamics. However, this model also presents unique challenges. Integrating multiple classes into these projects requires participants to assume specific roles as the project progresses, potentially diminishing the visibility and perceived value of each discipline's distinct contributions and consequently leading students to feel marginalized. For example, business students focusing solely on financial projections, without engaging in the project's design and development, might feel their efforts are underappreciated, restricting their ability to engage with and influence the project's wider scope. Additionally, the broad spectrum of experience and expertise levels, from first-year to fourth-year students, can create frustration regarding work quality and pose challenges in providing appropriate feedback across different disciplines (Warr & West, 2020).

Alternatively, interdisciplinary learning can be implemented within a single course setting, often at the upperclass level. An example is a senior-level capstone engineering course, where students from various engineering specialties form multidisciplinary teams to collaborate on design projects (Oattawi et al., 2021). Similarly, students majoring in management, design, and engineering participate in thematic interdisciplinary courses in their upper-level years. This approach promotes the integration of knowledge from these diverse fields, enriching their learning experience at more advanced stages of their studies (Xu et al., 2022).

Integrating interdisciplinary learning broadly and early in the undergraduate curriculum offers significant benefits. Incorporating this approach in the initial stages of higher education transforms students' academic journey by cultivating an integrated mindset from the start. It ensures students perceive disciplines not as siloed fields, but as interconnected parts of a comprehensive whole—essential for developing both critical and integrative thinking, innovative problem-solving skills, and collaboration. This approach gives all students, regardless of their major, equal access to a broad spectrum of knowledge and perspectives, fostering a sense of community and mutual respect among students from diverse academic backgrounds. Additionally, early engagement with multiple disciplines helps students make more informed decisions about their majors and career paths, potentially reducing the time and resources for later adjustments in their academic paths. This model, by its very nature, makes learning more relevant and exciting, thereby increasing student motivation and retention. Interdisciplinary learning for early-year students not only prepares them for their future careers but also equips them with the intellectual agility to become lifelong learners.

Despite these benefits, research on the integration of interdisciplinary learning in introductory courses, which encompass a broad spectrum of disciplines, and the exploration of their associated challenges, instructional strategies, and assessment methods, remains scarce. This study seeks to address these gaps and provide insights into these critical areas.

CHALLENGES AND INSTRUCTIONAL STRATEGIES

This course is designed for undergraduates from business, design, and engineering disciplines, and serves as the introductory course in an interdisciplinary core curriculum at a regional private university comprised of Finding and Shaping Opportunity, Systems Thinking & Sustainability, Research Methods, and integration with the Capstone project in each discipline.

This course, created as the initial offering in the core curriculum, merges principles of human-centered design thinking with technological insights and business strategies to help students identify opportunities and develop innovative business models that deliver value to consumers. The Systems Thinking & Sustainability course offers a holistic problem-solving framework, focusing on the interconnectedness of natural and social systems. The Research Methods course enriches the learning experience by blending liberal arts perspectives with a range of research tools to analyze human beliefs, behaviors, and cultural practices. Finally, students are afforded the opportunity to apply skills developed throughout the core curriculum in the context of their own discipline as part of their Capstone project experience.

The focus of this paper is on the introductory course, which leverages design thinking principles to guide students through the process of identifying opportunities for value creation in a business context. The course places an emphasis on problem identification, prototyping, and iterative development within interdisciplinary teams, aiming to formulate value propositions that offer financial, social, and environmental benefits. Through this approach, students

are encouraged to employ critical and creative thinking skills to develop business models that are both desirable and viable.

Scaffolding Strategy for Building Foundational Knowledge

Integrating business, design, and engineering into this course poses several challenges. Early-year undergraduate students often lack foundational knowledge in their fields and critical thinking skills, a result of their more limited life, educational, and professional experiences. This deficiency in depth and breadth complicates their ability to fully engage with interdisciplinary content. To equip students with an understanding of design thinking, business models, and innovative technologies in the business landscape, a scaffolding teaching strategy was utilized.

Scaffolding, a teaching strategy facilitating beginners in solving problems or achieving goals otherwise unattainable without such support (Doo et al., 2020; Wood et al., 1976), offers essential support as learners engage with new concepts or skills. This support is strategically reduced over time, allowing students to increasingly take charge of their learning process. The approach enhances learning by connecting new information to familiar concepts, breaking down complex tasks for easier comprehension, and providing clear instructions. Through modeling, strategic questioning, and continuous feedback, it enhances understanding and promotes critical thinking. As students progress, the approach gradually shifts responsibility to them, nurturing independence, encouraging more integrative thinking, and building confidence in their own learning.

For the first few weeks, the strategy involved establishing foundational knowledge alongside the regular progression of course content. To acquaint students with contemporary business models and technologies prevalent across industries, each class began with video clips showcasing companies exemplifying various innovative models. This was followed by in-class discussions, steered by specific questions and prompts, to deepen students' understanding of core types of innovation, patterns in business models, and their alignment with business principles. The discussed models included businesses with a variety of core concepts for innovation including the sharing economy, renting, drop-shipping, subscription-based, Freemium, direct-to-consumer, as well as emerging trends in financial technology (fintech), property technology (proptech), and artificial intelligence tools. With a foundational grasp of these concepts, students then chose a topic from the discussions for comprehensive research on the chosen business model or technology, leading to a presentation to their peers. The interdisciplinary teams that students created for their research assignment provided a range of perspectives, covering various aspects including consumer needs, financial and revenue implications, design features, and the technologies employed.

Inquiry-Based Learning and Scaffolding Strategy for Enhancing Critical and Design Thinking

Early-year undergraduate students face distinct challenges when engaging in interdisciplinary learning. They are still in the process of developing critical thinking skills needed to analyze and synthesize information from different disciplines. Moreover, they encounter the complexity of moving through ambiguous problem spaces typical of interdisciplinary projects, which often lack clear, predefined solutions. Such uncertainty can be overwhelming for students accustomed to more structured learning environments. Moreover, the shift towards project-based learning demands that students take greater initiative and responsibility for their learning. Inquiry-based learning, combined with the scaffolding approach, was employed to address these challenges.

The inquiry-based learning approach is centered around student-initiated inquiries, questions, or interests, promoting self-directed exploration. This method enhances critical thinking, problem-solving, communication, and collaboration skills (Aditomo et al., 2013). It leads students from formulating a question to investigating and presenting findings, with their own curiosities or interests forming the basis of their projects. In this student-centered process, collaboration with faculty and peers is critical, allowing students to explore, research, and develop their projects in a supportive and exploratory environment.

This course culminated in the development of business models that were desirable and viable, achieved through collaboration in an interdisciplinary team setting. Emphasis was placed on crafting value propositions that delivered financial, social, and environmental benefits. By adopting the scaffolding approach to incrementally increase complexity, this process was broken down into three parts: two preparatory individual assignments focused on opportunity identification, followed by a team project that expanded upon the foundational work from these assignments.

Before diving into interdisciplinary team projects, students undertook two individual assignments. The first task involved identifying areas of potential innovation that resonated with their personal interests, experiences, passions,

or career goals, using inquiry methods like questioning and research and design thinking techniques like framing and reframing. The focus was primarily on problem identification and question formulation around opportunities, rather than on solution generation. Students then brought their assignments to class for feedback, utilizing the Think-Pair-Share strategy—initially reflecting independently, then discussing in pairs, and finally sharing with the whole class for collective input from peers. At this stage, the instructor used strategic questioning and ongoing feedback to assist each student in refining and clarifying their ideas, guiding them to develop concepts that were both practical and feasible. The second assignment entailed a reflective essay detailing the process of uncovering opportunities through human-centered design methods. This included conducting ethnographic research, soliciting collaborative insights from diverse perspectives, and reflecting on the learning process—focusing on how their understanding and perspectives had evolved throughout the process.

Strategies for Team Collaborations

Interdisciplinary learning combines knowledge from different fields to address complex problems, underscoring the importance of team collaboration. This collaboration integrates diverse perspectives and expertise, driving innovation and holistic solutions. It reflects real-world situations where cross-disciplinary professionals collaborate on multifaceted problems. Moreover, team projects offer an active learning environment where students can navigate uncertainty, reflect on their experiences, and learn from each other's strengths.

However, interdisciplinary team projects for early-year undergraduate students often encounter challenges due to students' diverse backgrounds and early college experiences. Effective team dynamics present a significant challenge as these students are often just beginning to learn crucial teamwork skills such as communication and conflict resolution. Additionally, these students struggle with time management, trying to balance project demands with other academic and personal responsibilities. The diversity, while providing a broad spectrum of viewpoints, also complicates aligning communication styles and expectations, adding complexity to team collaboration.

To achieve a diverse blend of perspectives and skills within each team, strategic team formation involved diversity in academic majors and the utilization of a Team-Role Test. This test, drawing on team role theories, competency frameworks, and the Big Five Personality theory (*Team Roles Test Theory|123Test*, n.d.) helped students identify their roles such as Driver, Executive, or Team Player. Teams were then formed to ensure a balanced mix of majors and team roles.

To enhance team collaboration, members completed a Team Charter that established ground rules, set expectations aligned with team goals, identified potential barriers, and outlined a conflict management and resolution process. This Team Charter assisted students in tackling challenges effectively and fostering a cooperative and productive team environment.

ASSESSMENT TOOLS FOR INTERDISCIPLINARY LEARNING

Assessing interdisciplinary learning presents several considerations. Interdisciplinary learning emphasizes creativity, diverse types of thinking, and problem-solving – skills that are not easily quantified. Traditional assessment methods focused on disciplinary-based functional knowledge may not adequately capture these complex cognitive processes or the innovative solutions students develop. The assessment process should measure both individual and team-based skills and knowledge gained throughout the learning experience. Moreover, with team collaboration as a critical element of interdisciplinary learning, evaluating individual contributions within a team setting can be complex. It is challenging to distinguish between the collective performance of the group and the individual learning outcomes of its members. Interdisciplinary learning also places high value on the learning process as much as the final outcome. Assessments should be able to capture this process, including the ability to iterate ideas, adapt to feedback, and integrate interdisciplinary perspectives to refine approaches based on new insights. Additionally, assessing the learning outcomes of this interdisciplinary course should align with both program-level requirements for accreditation and broader university-level assessments.

Two learning objectives were established for assessing this interdisciplinary course: (1) blend knowledge and skill sets from different disciplinary areas to identify business opportunities and to provide solutions to real-world problems and (2) demonstrate the ability to work effectively in interdisciplinary teams. These objectives also contributed to measuring a program-level learning goal centered on integrative learning and decision-making skills, and they were in alignment with university-level learning goals of synthesizing disciplinary and liberal arts/humanities insights to create transdisciplinary strategies; as well as appreciating and valuing local, global, and conceptual diversity.

Assessing Integrative Knowledge and Skill from Interdisciplinary Perspectives

Assessing interdisciplinary learning requires a holistic approach. This form of learning emphasizes the ability to integrate skills and knowledge from cross-disciplinary perspectives, as well as collaborative and interpersonal skills. Therefore, the assessment framework should capture both the individual learning outcomes and the collective performance of a group. Utilizing both an individual assignment and a team project becomes an important strategy for effective assessment.

For the assessment of individual learning outcomes (Learning Objective 1), the evaluation concentrated on the preparative individual assignment, particularly the reflective essay on opportunity finding. The assessment examined critical thinking, creativity, the incorporation of interdisciplinary views, and the ability to iterate and refine ideas utilizing a range of design thinking tools and feedback. It ensured that the assessment not only captured the final result but also the process and depth of understanding the student demonstrated in managing complex problems. A rubric for assessing individual assignments identified four critical outcomes: utilization of design thinking tools, the process of idea iteration, integration of interdisciplinary perspectives, and effective synthesis of information. Student performance in each area was categorized into three levels: Exceeds Expectations, Meets Expectations, and Does Not Meet Expectations. Below are the descriptions for each assessment criterion.

1. Tools: Demonstrates effective use of various tools of constraint in finding opportunities.
2. Process: Evidence of thorough ideation that pushes through initial ideas to reveal more creative opportunities that may be a priority to address.
3. Perspective: Incorporates empathy and outside perspectives in meaningfully defining the priority problem/opportunity based on current reality.
4. Documentation: Synthesis of information regarding both the priority problem/opportunity and the opportunity finding process into an attractive, well-organized, and professional deliverable.

Assessing Team Collaboration

The team project was designed to assess collaborative and interpersonal skills, in addition to the group's overall performance. Evaluating team collaboration introduced an added level of complexity by requiring an assessment of each student's contribution to the collective effort. This challenge was addressed through a multifaceted assessment strategy that included the use of a Team Charter, peer evaluations, and the instructor's assessment of the team's output.

A Team Charter served as a roadmap for organizing the group project, aiming to cultivate a collaborative and respectful work environment by proactively setting clear expectations and guidelines to address challenges and conflicts. The essential elements of the charter are outlined below.

1. Team Roles: Requires each member to take turns as Project Manager, with a documented rotation schedule for equitable leadership.
2. Team Goals: Assigns roles and sets goals.
3. Ground Rules: Addresses meeting logistics, attendance, assignment standards, and communication.
4. Conflict Management: Addresses potential team conflicts with a step-by-step approach for resolution.
5. Criteria for Team Member Dismissal: Sets clear standards for removing a team member, based on participation and performance.

A rubric designed to assess the ability to work effectively in interdisciplinary teams (Learning Objective 2) encompassed three main components: team structure, team output, and peer evaluation. The team structure assessment was two-fold, focusing on the clarity, documentation, and establishment of goals and rules, as well as the clear definition and adherence to team members' roles, as outlined in the Team Charter. Team output evaluation included three areas: the timely completion of work, the integration and cohesion across individual contributions, and the overall quality of the collaborative efforts. All components were assessed using three performance levels: Exceeds Expectations, Meets Expectations, and Does Not Meet Expectations. The peer evaluation segment assessed team and individual performance across six dimensions on a scale from unacceptable to excellent. The average peer evaluation score was translated into the three performance levels: Exceeds Expectations, Meets Expectations, and Does Not Meet

Expectations. Below are the descriptions of peer evaluation dimensions:

1. Readiness/Preparation: Assesses preparedness and completion of assignments.
2. Attendance: Evaluates punctuality, consistent presence, and engagement during meetings.
3. Participation: Measures contribution quality and quantity, and work quality.
4. Decision Making: Gauges commitment to team consensus and collaborative decision-making.
5. Member Support: Reviews respect, listening, and encouragement of team participation.
6. Conflict Management: Considers fair conflict resolution and leadership in problem-solving.

CHALLENGES AND STRATEGIES FROM FACULTY PERSPECTIVES

Introducing interdisciplinary learning into early-year undergraduate courses, especially within a single-course setting, presents several challenges from the faculty's perspective. This section explores these challenges as seen by faculty members, along with the strategies that have been employed and those that hold potential for addressing these difficulties.

Teaching these courses requires instructors with multidisciplinary knowledge and familiarity with various tools and thinking frameworks. However, faculty members in higher education typically possess disciplinary-based knowledge and may not feel comfortable teaching interdisciplinary courses as a single instructor. Recruiting faculty with diverse backgrounds or an integrated mindset is therefore challenging. Additionally, introductory courses are often offered in multiple sections, making it difficult to ensure consistency in teaching materials and quality across sections.

To address these challenges, the role of a course coordinator becomes critical for the introductory interdisciplinary course. The coordinator leads faculty recruitment efforts and collaborates closely with instructors across various sections to maintain consistency in course content and quality. This role involves supporting instructors with teaching materials and resources, enhancing communication among instructors, providing training for new instructors, and organizing workshops focused on professional development and interdisciplinary teaching methodologies.

Another challenge involves the constant need to refresh course materials to reflect the rapid advancements in technology and the continuous emergence and evolution of companies with innovative business models. For example, employing instructional strategies such as presenting video clips in the early weeks to help early-year undergraduate students quickly grasp foundational concepts necessitates that faculty commit considerable time and effort to consistently update materials throughout the semester.

Establishing a shared repository workspace proves crucial for addressing this challenge. It allows instructors to share instructional resources, easing the burden of material refreshment and ensuring consistency across sections. Moreover, offering faculty a reduced teaching load for a specified period facilitates the necessary time and effort for continuous updates and the advancement of knowledge and teaching strategies.

Sharing the outcomes of interdisciplinary learning, such as through program-wide competitions or end-of-semester showcases of student projects from different course sections, is essential. It underlines the value of interdisciplinary learning and motivates greater involvement from both students and faculty within the broader academic community.

CONCLUSION

Interdisciplinary learning is essential for preparing students to navigate today's complex business environment. This study has shed light on the challenges associated with incorporating interdisciplinary learning, particularly at the introductory undergraduate level. It is evident that students at this stage often lack foundational knowledge and critical thinking abilities, which complicates the application of interdisciplinary concepts.

However, despite these challenges, integrating interdisciplinary learning early in the undergraduate curriculum remains crucial. It cultivates an integrated mindset, critical thinking, and collaboration among students from diverse academic backgrounds. This approach promotes informed decision-making about majors and careers, and enhances student motivation and retention, preparing them for future careers and lifelong learning.

Drawing from the experience of integrating business, design, and engineering in an introductory undergraduate course, this study underscores the critical role of early exposure to interdisciplinary education and uncovers instructional

strategies like scaffolding and inquiry-based learning as effective means to enhance students' learning experiences. Moreover, the development of assessment tools tailored to measure both individual and collective learning outcomes has been emphasized. By providing insights into instructional strategies and assessment methods, this study aims to assist educators in effectively implementing interdisciplinary learning within undergraduate business education.

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Navigating the Challenges of Academic Dishonesty in Online Accounting Education: A Look at the Increasing Use of Academic Resource Sites

Letitia Meier Pleis, Metropolitan State University of Denver, Colorado, USA

ABSTRACT

This paper explores the intricate challenges of maintaining academic integrity within online accounting courses, looking at both the initial rise of online education before the COVID-19 pandemic and its continuance post pandemic. Utilizing the fraud triangle framework, this study examines the factors contributing to increased opportunities for cheating, the rationalization behind such unethical behaviors, and the pressures leading students towards academic dishonesty. The research highlights the significant role of academic resource sites (ARS) like Chegg and Course Hero in providing students with unauthorized access to assessment answers, further exacerbated by the advent of sophisticated technologies such as generative AI tools. The intention of this paper is to increase awareness of the unethical use of ARS by accounting students for online assessments. This study shows that there has been a significant increase of the use of these resources. The importance of curbing the use of ARS for cheating goes beyond the integrity of the accounting class, unethical behavior as a student has been shown to increase unethical behavior as a professional. The accounting profession relies on ethical behavior.

Keywords: Academic Integrity, Online Education, Academic Resource Sites (ARS), Cheating Deterrence

INTRODUCTION

In the accounting profession ethics and integrity are essential. Teaching of accounting ethics has been researched since the 1970s (Nguyen and Dellaportas, 2020), but teaching ethics is not enough. Ethical behavior must be established while still in school, studies have shown that cheating while a college student increases the likelihood of cheating as a professional (Smith, et. al, 2009). An area of concern over academic integrity is online education and online assessments. During the COVID-19 pandemic there was a rapid switch to online education and while students are coming back to the classroom online education continues to be higher than it was before 2020 (Barshay, 2024; Hill, 2024; Schwartz, 2023). Even before the pandemic, accounting programs were increasing their online offerings and online education was becoming an acceptable alternative to in person classes (Grossman and Johnson, 2017). While online classes provide the benefit of flexibility, maintaining academic integrity is paramount. While cheating has always been an issue in higher education, the online environment has increased the opportunity to cheat (Jenkins, et al. 2023). The rapid increase in technological advancements and on-demand services from academic resource sites (ARS) such as Chegg and Course Hero has created a challenge to traditional assessment techniques in the online environment.

Bierstaker, et al (2024) used the fraud triangle as a lens for incidences of cheating behavior in remote evaluations and found that students' perceptions of opportunity to cheat to be higher in the online environment. While others have suggested ways to decrease that opportunity for cheating in the online environment (Conaway and Wiesen, 2023) technological improvement such as generative AI and privacy issues with remote proctoring services have made this an increasingly difficult task. Many students rationalize using such sites because they believe they will not get caught and often many do not. Some of this is simply because educators are unaware of these sites or do not know how to discover usage of these sites (Conway and Wiesen, 2023). Increasing educator awareness of websites that provide homework and exam assistance can be a start to decreasing the rationalization of using such sites. Educators should also consider how assessments impact the motivation/pressure side of the fraud triangle. Creating an educational environment that focuses on intrinsic motivation should lead to less cheating.

THE CHALLENGE OF ACADEMIC INTEGRITY IN ONLINE ACCOUNTING COURSES

Academic integrity in remote learning environments has been a concern from the beginning. Studies have shown that a majority of students cheat to some extent and the perception is that it is even more rampant in the online environment (Whitlow and Metts, 2024). The online learning environment leads to many reasons a student might cheat. There is the lack of oversight from the professor, students often take online classes because they already have a busy schedule leading to time stress, the online environment can be isolating, and simply the ease of access to outside sources of

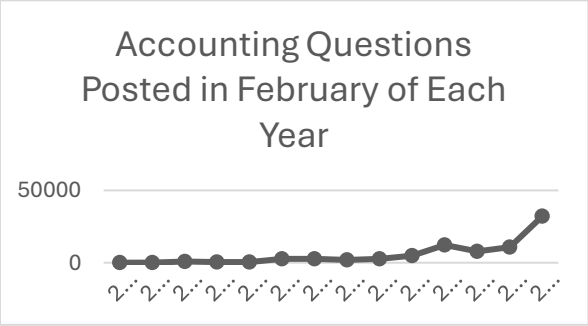
information (King, et. al 2009). Because of the potential for academic integrity concerns employers have been hesitant to hire graduates from purely online institutions (Grossman and Johnson, 2016, 2017; Mauldin, et. al., 2018; Richards, et. al., 2019). Employers do have reason for concern. If the incidences of cheating behavior is higher in the online environment then those students that cheat are more likely to cheat as employees (Smith, et. al, 2009). Despite these concerns the growth of online education continues to increase. It is necessary then to decrease cheating behavior in the online environment. Thus, educators need to be aware of how students are cheating.

Cressey (1953) first introduced the fraud triangle with three elements for unethical behavior. His research supported that fraud was a learned behavior based on motivation, opportunity, and rationalization. The fraud triangle is a well-established framework withing accounting research to gain insight into professional unethical behavior and more recently in unethical behavior of accounting students (Bierstaker, et. al, 2023). Within the accounting education context motivation can be seen as the emphasis on grades, either earning high marks or simply not failing the class and pressure to turn assignments in on time. Opportunity refers to being able to pursue the unethical behavior, in this context cheating, without being caught. Rationalization refers to the ability to justify the unethical behavior as either necessary or simply not dishonest. There are many potential justifications a student can make to lessen their guilt of cheating. Online accounting education is a great environment for motivation, opportunity, and rationalization for cheating.

THE ROLE AND IMPACT OF ACADEMIC RESOURCE SITES ON OPPORTUNITY

Academic resource sites have been around for several years now. Many present as helpful learning resources, but despite potentially good intentions they have turned into unethical cheating resources. Often students pay a monthly membership to have access to on-demand tutors, repositories of lecture notes and textbook problems with answers. Chegg was founded in 2006 and primarily focused on renting textbooks to students. Through a series of acquisitions, it added study aid content and tutoring. By the beginning of 2018 Chegg had a repository of over 7 million textbook solutions (Sharma, 2018). At the beginning of the pandemic Chegg's stock price increased 130% and universities started to notice students using the sites for exam questions (Downey, 2020; Pirog, 2020; Trefis Team, 2020). Until August 2022, Chegg would provide limited information to universities and colleges on usernames, emails and IP address, but stating student privacy concerns, Chegg has changed this policy. Another popular academic resource site is Course Hero. Also founded in 2006, the primary focus was for college students to share lectures, class notes, exams and assignments in a digital format. While intentions seem to be more focused on providing sharable learning material, there is a homework help option. Course Hero has a question-and-answer archive starting from 2010 (https://www.coursehero.com/sitemap/questions/). For accounting the first questions come from March 2010, and totaled 19 questions for verified experts to answer. A count of number of questions posted in February of each year from 2011 to 2024 was completed. As Figure 1 shows there was an upward trend from before the pandemic February 2020, with around 4,700 questions posted, and February 2021, with around 12,000 questions posted. As classes started to come back to campus the question posting seems to level off for February 2022 and 2023, but during 2024 a dramatic increase in the number of accounting questions posted occurred with almost 32,000 questions. This is an alarming increase that accounting educators need to address.

Figure 1: Accounting Questions Posted to Course Hero in February of Each Year



Currently, for Courses Hero a new user gets to ask five questions for free and receive answers and explanations in as few as 15 minutes. Experts are available 24/7 to answer these questions. To ask additional questions a user can sign

up for Course Hero Premier for $119.40 annually or $29.95 monthly. Alternately, a student with multiple email accounts can keep signing up for new accounts. There are many more similar sites including Bartleby and Brainly that students use for homework and exam help so even at 32,000 questions posted in February 2024, it does not represent all the possible accounting questions that students sought help for during that month. Table 1 provides examples of questions posted to Course Hero during February 2024.

Table 1: Examples of Questions Posted to Course Hero February 2024

It is essential for racing teams like Hendrick Motorsports to carefully manage their budgets to remain competitive and achieve their performance goals while ensuring financial sustainability. In an initial post of at least 200 words, explain how implementing a robust budgeting process can help Hendrick Motorsports optimize its financial resources, control expenses, maximize revenues, and sustain its position as one of the most valuable racing teams in NASCAR. In your post, Describe the objectives of budgeting in business. Describe the human behavior problems that can arise when budget goals are set too high, too low, or conflict with the goals of the organization. Discuss how budgeting affects the managerial functions of planning, directing, and controlling. Compare zero-based budgeting, static budgets, and flexible budgets. Which of these budgeting methods would you recommend for Hendrick Motor Sports and why? Explain how Hendrick Motorsports uses budgets to ensure that its revenues exceed expenses.
At Zora Pte Ltd., the monthly fixed selling and administrative expenses are $193,000 and the variable selling and administrative expenses are $2 per unit sold. Except for depreciation of $1,930, these are all current cash outlays. If the budgeted sales amount for September is 4,900 units, what should the September selling and administrative expense budget show for cash disbursements for selling and administrative expenses?
Pea Company purchased 70 percent of Split Company's stock approximately 20 years ago. On December 31, 20X8, Pea purchased a building from Split for $408,000. Split had purchased the building on January 1, 20X1, at a cost of $508,000 and used straight-line depreciation on an expected life of 20 years. The asset's total estimated economic life is unchanged as a result of the intercompany sale. Prepare the consolidation entry or entries needed to eliminate the effects of the intercompany building transfer in preparing a full set of consolidated financial statements at December 31, 20X9.

In addition to being able to ask direct questions to "experts," users of Course Hero have access to the answers to questions others have submitted. Users can search and unlock the answers by either paying for Course Hero Premier or uploading course material to the site for free unlocks. Similarly, anyone can search the vast content stored on Chegg and after paying the fee, access the answers. This means it is important to regularly update assessment and be cautious about using textbook questions. Still the real value for a student looking to cheat is the on-demand answers that these sites provide for any question. During the pandemic, Chegg advertised that an expert could provide an answer in as little as 30 minutes. Conway and Wiesen (2023) found that it took between 15 and 94 minutes to receive solutions to intermediate accounting exam computational problems during summer 2019 to Spring 2021 on Chegg. This led to the recommendation of strict availability window, a challenging time limit, and no backtracking (not able to return to previous questions). These suggestions are approaches to control for time and thus lessen the opportunity for using these sites and can be effective when there is a delay in receipt of the answer.

Quickly technology has eliminated time constraints. On November 30, 2022 OpenAI launched ChatGPT and changed the game. While initial research found that ChatGPT did not perform as well as students of accounting exams (Wood, et al 2023), the technology quickly improved and ChatGPT 4.0 was able to pass the CPA exam (Tyson, 2023). While controlling for time might still help, answers now can be produced instantly. Even the academic resource sites are adding generative AI to their resources. Chegg and Course Hero offer the option to have an expert verify the answer, but if you need an answer right now, it can be provided through AI. In Course Hero the AI answered questions do not seem to count against the number of questions a user can ask. This might explain the recent increase in questions posted. There are other controls available to lessen the ability of achieving a correct answer from generative AI, but it doesn't eliminate the students attempt to cheat. It is likely the better AI gets at answering complex questions the more use it will get from students looking to cheat.

Other recommendations to lessen the opportunity to cheat include the use remote proctoring and lock-down browser technology (Bierstaker, et al 2024; Conway and Wiesen, 2023). These technologies are used to simulate an in-person exam experience. Lock-down browser technology prevents a student from accessing other websites during the exam. Remote proctoring can include webcam monitoring from a human proctor or a webcam recording of the test taker that

is analyzed for suspicious behavior. The technology can be very sophisticated and can include environmental scans, keystroke tracking, gaze and eye tracking and head movement detection. Conway and Wiesen (2023) note that use of Chegg came to an end in the semesters that these technologies were implemented, and research has shown that exam scores are significantly lower on online proctored exams compared to exams without proctoring controls indicating less cheating (Bierstaker, et al.,2024; Whitlow and Metts, 2024). Despite these successful control methods there are several issues with using these technologies. Some schools have banned the use of proctoring software and there have been legal challenges over privacy concerns. In addition, a student may lack the access to technology such as using a library computer that does not allow for software to be installed, the proctoring can cause increased test anxiety, and might be in conflict with accessibility needs (Langenfeld, 2020). There have also been issues with false positives and sometimes the technology simply fails. Not being able to get the monitoring software to work only increases a potential stressful exam taking situation. There is also the possibility that the lower exam scores in remote proctoring situations are not the result from students being unable to cheat, but from exam anxiety created by the proctoring.

RATIONALIZATION AND MOTIVATION TO CHEAT

Rationalization is where individuals justify their actions in a manner that allows for them to avoid guilt or feelings that they are doing something wrong. Justifications for cheating include a perception that it does not cause harm to others, will not easily be caught, others are doing it, or simply that it was unknown that it was not allowed. A recommendation to mitigate rationalization is to make sure instructors are aware of ways that students are using academic resource sites, discovering students using these sites, and reporting the use of these sites. While monitoring and controlling for use of academic resource sites is often an overwhelming job for an instructor, indicating knowledge about these sites and why the use is not appropriate for an assessment can eliminate some of the justifications for using the sites.

Accounting students are motivated/pressured to achieve high grades. This is true if the delivery of the course is online or in-person. Though it could be argued that an online class leads to an environment of higher extrinsic motivation such as getting a good grade in the class, passing the class, or earning the credits for the degree rather than intrinsic motivation such as a desire to understand the course material because it will be useful later. Someone with intrinsic motivation is less likely to perceive a need to cheat as compared to someone with extrinsic motivation (Burke and Sanney 2018). Smith, et al (2009) found those that are intrinsically motivated are less likely to engage in neutralizing behaviors (rationalization and justification of cheating) and cheating behaviors. Overall, accounting education both online and traditional need to include pedagogical strategies to foster intrinsic motivation. Future research needs to focus on what pedagogical strategies foster intrinsic motivation in online accounting education.

WHERE DO WE GO FROM HERE?

If online education is here to stay, how do we maintain academic integrity despite the opportunity, rationalization, and motivation to cheat? Evidence indicates that technology is only going to increase the opportunity for online cheating and current efforts to stop the use of ARS have limitations. Deterring rationalization by educating students about why cheating is unethical behavior is a needed first step. While the honor code literature results are mixed about awareness curbing cheating behavior (Bierstaker, et al 2023), awareness of the unethical behavior will at least make some students pause before accessing ARS sites. If it is too difficult to remove the opportunity to cheat within online education and online education is not going away, then it is important to remove the motivation to cheat. Traditional assessment techniques such has high value exams and strict deadlines put the focus on grades and achievement rather than learning and understanding. There is a need to move a student from being extrinsically motivated to intrinsically motivated. The accounting profession depends on ethical members, if the unethical cheating behavior continues to increase with accounting students it is likely they will behave unethically as a professional. Accounting educators must emphasize that the use of academic resource sites for assessment answers is cheating and unethical behavior.

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Letitia Meier Pleis, Ph.D., CPA, CMA, CGMA, CSCA is a professor of accounting at the University of Metropolitan State University of Denver. Her research interests include accounting education, small business accounting, and accounting related decision making.

Using AACSB Best Practices to Improve Project Based Learning Outcomes in Lean Six Sigma Education for Supply Chain Management Majors

Thomas V. Scannell, Western Michigan University, Kalamazoo, Michigan, USA
Sime Curkovic, Western Michigan University, Kalamazoo, Michigan, USA

ABSTRACT

Supply chain management graduates develop a range of skills and knowledge that enable them to support decision making and continuous improvement efforts for the organization. This study examines how the continuous improvement courses in the supply chain management curriculum at a midwestern university were improved by focusing on the project based learning experience. The AACSB best practices for curriculum change proved to be an efficient and effective approach to making these active learning changes, and in providing greater value to the students and other stakeholders.

Keywords: Supply Chain, Continuous Improvement, Lean Six Sigma, Yellow Belt Certification, Business Education, Project Based Learning, Active Learning, AACSB

INTRODUCTION

Competitive pressures within and across all industries require employees to be more efficient and effective through continuous improvement (CI) of processes. This requirement is perhaps most profound within the supply chain management (SCM) profession, where processes cut across inter- and intra- organizational boundaries. SCM professionals can better contribute to CI efforts by utilizing the theories, practices and tools driven by lean six sigma (LSS).

This paper discusses the process and importance of following curriculum change best practices to improve the educational outcomes for students through project based learning (PBL). It examines how a change to the CI component of the SCM curriculum created a more efficient course management process, better aligned the content of a prerequisite course to the subsequent course, emphasized active learning, enabled students to achieve LSS yellow belt certification, and better prepared students for their careers. It also illustrates how student centered changes provided benefits to other stakeholders as well.

This paper is organized as follows. First, a brief literature review discusses the important linkage between SCM and CI, evaluates the effectiveness of project based learning (PBL), and identifies best practices for the curriculum development process. Next, the actual curriculum development and change process is detailed, the resulting change is presented, and an initial stakeholder assessment of the impacts of the change are discussed. The summary section identifies other potential future changes to the CI curriculum.

LITERATURE REVIEW

The imperative for continuous improvement (CI) in processes, driven by competitive pressures, is acutely felt within the field of Supply Chain Management (SCM) (Kannan and Tan, 2005). These CI initiatives should extend beyond the internal supply chain functions of an organization to all of its supply chain partners (Prado-Prado, 2009). A ten-step solution process for improving supply chain performance through the lean six sigma (LSS) approach has been prescribed (Martin, 2014). This industry imperative to integrate CI and SCM has driven increased academic research into a range of related topics such as applying LSS to mitigate supply chain risks and driving sustainable supply chains (Mahdikhani, 2023).

These trends highlight the importance for SCM professionals to be proficient in CI. Many experts suggest that LSS competency was once a bonus skill for SCM professionals, but is now a necessary one (Six Sigma Daily, 2018). However, both the lack of LSS knowledge and the lack of LSS training create barriers to successful LSS initiatives in SCM (Ali, 2020). It is thus incumbent on higher education to develop the LSS capabilities of SCM students to best prepare them for their careers.

Active learning and project based learning (PBL) are effective tools as they promote student learning, engagement, community and connectedness (Allsop et al., 2020). PBL may help students gain a deeper level of understating of the course concepts and tools, and to develop ideas for applying those concepts and tools in future and different contexts (Shatzkin et al, 2022). Active learning within the supply chain discipline fosters critical thinking, teamwork, and project management (Miller et al., 2023). Various studies highlight the positive impact of other related innovative teaching methodologies, including the flipped classroom approach and economical, flexible learning spaces (Kanigolla et al., 2014; Tay, 2021, Vardanega and Fedeli, 2019). The flipped approach enables significant opportunities for instructors to engage with students as mentors as compared to a traditional classroom approach, allowing instructors to connect with both the students and the subjects (Tiahrt and Porter, 2016). These methodologies not only support the application of LSS in the context of SCM education but also emphasize the importance of critical thinking, teamwork, and project management skills. Active learning in higher education is enhanced through projects developed in partnership with industry (Dinis-Carvalho et al., 2017). PBL significantly impacts educational effectiveness, particularly beneficial in SCM education for providing practical, hands-on experience that complements the LSS foundations (Alacapınar, 2008).

Universities that are revising curriculum to incorporate LSS active learning should follow robust processes to ensure student success and stakeholder satisfaction. The Association to Advance Collegiate Schools of Business (AACSB), a business curriculum accreditation agency, identified ten best practices for curriculum redesign that were to be followed during this change: 1) Involve all stakeholders; 2) Make faculty a key part of the process; 3) Minimize "felt losses"; 4) Benchmark against other schools; 5) Allot sufficient resources; 6) Deeply scrutinize each potential change; 7) Set a deadline; 8) Stick to a budget; 9) Start small but start; 10) Build over time. (AACSB, 2017).

The collective insights from these studies identifies a pivotal shift in SCM education towards an experiential learning model that prepares students to meet the evolving demands of the industry. Integrating LSS with PBL in SCM education, aligned with AACSB best practices, underscores a strategic curriculum development approach focused on experiential learning and skill enhancement to meet contemporary industry demands. This comprehensive integration of LSS and PBL methodologies in SCM education not only aims to enhance operational efficiency and effectiveness within higher education institutions but also to align educational outcomes with industry demands, underscoring the critical role of leadership, continuous improvement, and strategic alignment in achieving educational excellence.

THE CURRICULUM DEVELOPENT AND CHANGE PROCESS

Impetus for Change

The SCM program at this university has historically been, and at the time of this change, was one of the highest ranked undergraduate SCM programs in the United States. However, as industry responds to competitive pressures, the required skill sets of the SCM professional needs to change. The SCM faculty, through market analysis and benchmarking efforts, determined that to remain a leader in SCM education, changes were needed including the development of two new courses. Specifically, a new advanced logistics and a new advanced sourcing course were to be included in the program. These new courses build upon the content of the existing sourcing and logistics fundamentals courses. A full discussion of that analysis and change to the overall curriculum is beyond the scope of this paper, but the decision to add two new courses necessitated the elimination of other courses, as there are limitations on the number of courses (credit hours) per major.

The prior curriculum included three CI courses. One course was focused primarily on quality management principles, and was not considered a PBL based course. It covered some components of lean systems, but it emphasized quality and six sigma principles. A second course that was PBL based required students to complete industry projects. The main challenge in implementing the course was that it did not require any CI course prerequisites. Students could be put in a position of working on industry projects not knowing which tools they may need to use, or how to use the tools. Though the instructor, students, and industry partners overcame this challenge, it put undue stress on the system, suboptimized the learning experience and project outcomes, and to some extent limited the scope of projects pursued.

The third course which was also PBL based, focused on the Try-Z training exercise developed by Nissan (Nissan, 2024). After completing the Try-Z training, students applied those principles by conducting a separate team project of their choosing. This was a capstone course, so students needed to be of senior standing, and have completed a number of pre- and/or co-requisites, including the aforementioned quality and project management courses. Though this course provided a great learning experience, there were challenges for both administration and students in scheduling it (it required three consecutive days of 8 to 10 hour meeting time) and there was no dedicated lab space (it requires

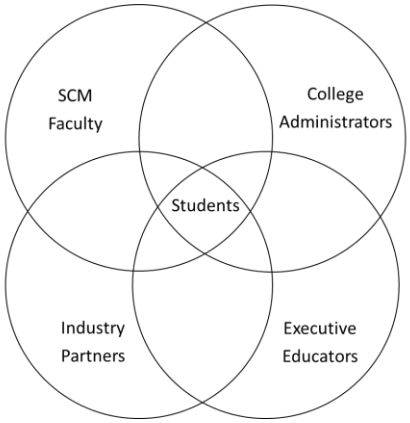
significant setup). Further, leading the Try-Z training is very demanding and specific, such that only one faculty member had the expertise to teach it.

The SCM faculty voted to retain the industry PBL course, though student preparation for the course needed to be enhanced. It was also decided that the Try-Z course and the quality management course needed to be consolidated into one course. The challenge was to develop a one semester course that both introduced the LSS management system and tools as was done in the prior quality management course, and that delivered a PBL experience which provided benefits similar to those achieved through the Try-Z class. The AACSB ten best practices for curriculum change were followed to make this change.

Practice #1: Involve All Stakeholders

The interest and needs of the key stakeholders, as well as the contributions they could make, were considered in developing a solution to that challenge. Each stakeholder sets student success as the priority, as reflected in Figure One. Though student success was the number one objective, each stakeholder had other goals and objectives for the change.

Figure One: Stakeholder Analysis



For students, enhancing the applicability of course content to real-world SCM challenges was vital. They sought a curriculum that not only offered certification but also instilled confidence in their practical skills through hands-on project experience with actual industry problems. To further enrich their learning experience, students also expressed a strong interest in mentorship programs with SCM professionals, facilitating a smoother transition from academic learning to professional application. They also sought a streamlined program planning process and enrollment process. This feedback was collected from two groups of students, with approximately ten students in each group. All students were either senior or junior level status. One group of students had just completed the CI courses associated with the prior curriculum, while the other group had yet to take any CI courses. The students in the latter group were selected because they already completed one or more internship experiences, so it was expected that they would have a better perspective of the CI skills needed in industry.

For SCM faculty, it was important to foster an environment that encouraged innovation in teaching and collaboration across disciplines. They also sought to integrate cutting-edge SCM software and tools into the curriculum to ensure students gained practical, market-relevant skills. For example, students gain practical skills in advanced analytics, including big data, predictive analytics, database management, and data mining with RapidMiner, SQL, and Python, along with advanced Excel functions, Power Query, Power Pivot, and visualization tools such as Tableau and Power BI. Our program incorporates cloud-based decision support services that enable students to track and analyze raw material market data, simulate purchase scenarios, and prepare for price negotiations with suppliers (n-alpha.com). Through our collaboration with leading companies, students engage in experiential learning projects through ERP system configurations using SAP and ScrimmageSim. Additionally, our curriculum includes training in business data analytics, covering essential skills in Python, Jupyter Notebook, and visualization libraries such as Seaborn, Matplotlib, and Plotly. We also emphasize the importance of geographic information systems (GIS) with courses utilizing ArcGIS Pro to manage supply chain risks and strategic planning. We also offer a specialized AI course tailored for non-technical students, enhancing their ability to apply artificial intelligence in business contexts. Beyond

this, faculty members emphasized the need for continuous professional development opportunities to stay abreast of the latest SCM trends and teaching methodologies, ensuring the highest quality of education. All SCM faculty participated in the discussion as part of the overall program change discussion.

The SCM program at this university is supported by an active Industry Council. Industries represented include healthcare, public administration, logistics, aerospace, automotive, industrial equipment, medical equipment, agricultural products, and food retailers for example. Feedback from this group was received during a semi-annual meeting where the overall curriculum change was discussed. Industry partners emphasized the importance of students' ability to work with data analytics and apply LSS principles to complex supply chain challenges. They also valued programs that encouraged students' creativity and strategic thinking in developing solutions to real-world problems, underscoring the need for a curriculum that balances technical skills with soft skills such as leadership and communication. Industry partners were also interested in collaborative research projects with the university, seeing it as a way to innovate within their supply chains while contributing to the educational process. One proposal from the industry partners that was put on hold because it would reduce course scheduling flexibility was to require students to take the two CI courses in consecutive semesters (Fall to Winter) so that they could work as one team on more complex and advanced industry projects.

For college administrators and staff, a seamless integration of the LSS certification into the SCM curriculum without disrupting the existing course structure was crucial. They aimed to leverage this integration as a unique selling point to attract prospective students and enhance the institution's reputation in business education. Furthermore, exploring digital and online platforms for executive education and certification courses was seen as an opportunity to expand reach and increase accessibility. Administrators also explored the potential for cross-disciplinary programs that would combine SCM with fields like data science and sustainability, responding to the growing complexity of global supply chains. Though administration indicate budgetary support would be provided for the change, the faculty and staff were determined to minimize new expenditures. The advising staff also encouraged limited prerequisite restrictions on enrollment to enable flexibility in scheduling courses.

The college has an SCM Center that is independent but supportive of SCM program and curriculum development. The center’s main goals are to provide SCM executive education and training to working professionals. The center was already providing LSS yellow and green belt training and certification. It had previously benchmarked other LSS certification programs and university courses, and worked with industry partners to develop the training content. The SCM Center sought to align its executive education offerings more closely with the evolving needs of the industry and the SCM curriculum. A strategic initiative was to develop partnerships with technology providers and other educational institutions to enrich the executive education portfolio with cutting-edge topics such as digital supply chain transformation and sustainability in SCM. Moreover, the center aimed to establish a scholarship fund to support students interested in advanced LSS certification, promoting leadership in SCM innovation. In addition, there was a push to increase the center's visibility through marketing and outreach efforts, aiming to establish it as a leading hub for SCM excellence regionally and nationally.

Practice #2: Make Faculty a Key Part of the Process

As discussed above, this was done. Not only were the faculty who were likely to teach the CI course involved in the discussion, other SCM faculty were consulted or informed throughout the discussion. Faculty from other disciplines such as leadership, strategy and organizational behavior were also consulted on an as needed basis. Two non-SCM faculty members with expertise in leadership and change, who are also part of the SCM Center team which provides lean six sigma training and certification for working professionals, were specifically consulted. They emphasized that for any CI initiative to be successful it must be supported by management, driven by a communication plan, linked to business strategy and measures, and coordinated through managed change at the individual and team levels. This interdisciplinary approach ensured a holistic curriculum development, reflecting a broad spectrum of insights and expertise. Furthermore, it fostered a collaborative culture among faculty, enhancing the integration of the CI principles across different areas of study.

Practice #3: Minimize Felt Losses

The most significant felt loss was the elimination of the Try-Z experience. This course had been a central part of the student experience and was valued by employers. To minimize felt losses, the possibility of including components of the Try-Z experience will again be assessed as the courses are continuously improved. Efforts to incorporate alternative lab-based experiential learning opportunities are underway, aiming to preserve the practical application

elements that the Try-Z experience provided. These initiatives are critical in maintaining the program's reputation for hands-on, real-world learning.

Practice #4: Benchmark Against Other Schools
Most SCM programs were found to require "experiential learning" as part of the overall program. This requirement could be met through internships, externships, co-ops, PBL based courses, or research for example. Specific to CI, most programs required at least one CI course, but it was unclear if there was a direct connection between such a course and subsequent industry based PBL courses. It was determined that the first CI course was to be a prerequisite for the second CI course, and a direct link had to be made between the content of each course. This alignment ensures a cohesive learning journey for students, building upon foundational CI concepts towards more advanced applications in PBL settings. Additionally, it underscores the program's commitment to a progressive educational model that mirrors the evolving dynamics of the SCM field.

Practices #5 and #8: Allocate Sufficient Resources, and, Stick to a Budget
The team was determined to avoid any new investments, at least during the initial changes. Fortunately, within the SCM program there were already a number of CI experts, so no new hires were required. Further, one of the advantages in a university setting is access to subject matter experts (SMEs) across many disciplines that are components of CI, such as change management, leadership, engineering and sustainability. The collaboration with such SMEs strengthened the content of the courses, with no additional costs. This resourceful approach not only optimized the existing talents and knowledge base but also ensured that the curriculum remained dynamic and relevant, reflecting the latest trends and practices in CI without imposing financial strain on the program.

Practice #6: Deeply Scrutinize Each Potential Change
For each topic included in the courses, the team asked: 1) how critical was the topic given the aforementioned goals, and 2) compared to other potential topics should this topic be included given the time constraints of a three credit hour course. Given those two screening factors, the final topic list resulted from an analysis of the tools that were often used in the industry PBL course, and the content provided by the SCM center during yellow and green belt training. Each topic was also scrutinized for how it might support PBL. This meticulous approach to curriculum development ensured that each included topic not only met educational objectives but also provided meaningful value to students' learning experiences, equipping them with the skills and knowledge demanded by today's SCM professionals.

Practice #7: Set a Deadline
The university has a prescribed schedule for when curriculum changes can be made. The team selected the next available cycle as the deadline. This supported the effort to keep the discussions moving at a reasonable pace. Adhering to this deadline fostered a sense of urgency and focus among the team members, facilitating efficient decision-making and ensuring that the curriculum revision process remained on track to meet institutional timelines.

Practices #9 and #10: Start Small but Start, and, Build Over Time
The goal was to develop courses given all the factors and goals just discussed, with the understanding that changes may be made as we learn. Many good ideas were proposed for the courses. For example, we discussed if the Try-Z training could be condensed to a shorter time period, perhaps four to six hours. This was considered a significant task that likely could not be made in time for the upcoming curriculum change cycle. So, that idea is still being reviewed. Also, discussions were held to determine if completion of both courses could position students to achieve LSS green belt certification. The addition of topics (e.g., multiple regression, failure mode effects analysis, design of experiments, etc.) and thus green belt certification were determined to be a bonus rather than a necessity for students. Further, such change may have caused undo stress on the entire system. Both ideas are still being reviewed, but we were determined to "start small". Given the background of the key stakeholders, this change process was always approached with the attitude that the courses will be continuously improved and (re)built over time. This iterative approach to curriculum development allows for flexibility and adaptability, accommodating new insights and feedback from stakeholders, ensuring that the SCM program remains at the forefront of educational excellence and relevance.

Resulting Course Design and Structure
This AACSB curriculum development process resulted in the following course requirements and structure. For ease of discussion, the courses will be referred to as "Course A (CA)" which is now a prerequisite course, and "Course B (CB)" which is an industry based project course.

Both CA and CB needed to provide student value independent of each other. CA was designed to develop the fundamentals of LSS through a "flipped hybrid" approach, and enable students to take the LSS yellow belt certification test administered independently by the SCM Center. Students viewed online lectures on their own time, then participated in discussions or simulations such as the dice game, Deming's Red Bead Exercise, value stream mapping and line balancing during in person meetings. Students who meet specific performance thresholds on assignments and tests in CA can take the certification test at no charge. Certification enables them to list LSS Yellow Belt Certification on their resume prior to graduation. Through industry projects, CB provides students with practical problem solving and management skills that potential employers value.

Both CA and CB were designed to be PBL. In CA, students will follow the A3 process to solve a problem of their choosing. Each week students are introduced to a tool or tools, then they are required to use that tool to analyze and improve their process. At the start of the semester students are presented a short list of project ideas (in the future they will be presented with actual completed project examples). Work related ideas include assembling a product, prepping food at a restaurant, developing/placing/filling purchase orders, and restocking inventory. Personal or non-work related ideas include preparing a full meal, doing a woodworking project, and running a sorority meeting. The students are then required to submit three project ideas where for each idea they need to address the following six questions: 1) What is the general description of the process? 2) Why does this process need improvement (you do not need specific measures at this point)? 3) What is the starting point of the process? 4) What is the ending point of this process? 5) Will you be able to video, and do you have permission to video, this process? 6) Will you be able to implement process changes in accordance with the semester schedule? The instructor reviews all three proposals, then through discussion with the student, one project idea is selected and scoped.

This enables the student to apply the tool in a relaxed and familiar setting. Projects that students have actually undertaken include improving the quality and efficiency of making a spaghetti and meatball dinner, changing the oil on a car, loading and unloading the music gear from the university band truck, and cleaning a saltwater aquarium for example. Student are required to use specific LSS tools such as SIPOC diagrams, spaghetti diagrams, process maps, fishbone diagrams, affinity diagrams, impact effort matrices and poka yokes for example.

In CB, students will also use the A3 process, but will be assigned a project by the industry partner. Students must determine on their own the appropriate tools to use, providing a sense of ownership and responsibility in the project. If they have not previously been exposed to the tool in CA, the instructor will assist and provide training on some of the more advanced LSS tools such as failure mode effect analysis, regression, and ANOVA. Projects that students have completed in CB include creation of new product launch and production ramp-up processes for a manufacturing firm, development of standardized customer service policies and procedures for a discrete parts manufacturer, improvement of trailer maintenance for a logistics firm, creation of an inventory management system and reorder procedures for a local manufacturer, and a new tooling storage procedure and tooling area layout again for an industrial products manufacturer. The topics covered in both CA and CB are listed in Table One and Table Two respectively.

Table One: Topics Covered in CA

Continuous Improvement (CI) Culture, Leadership, Change Shingo Model, Kubler Ross Change Curve, Tuckman's Theory of Group Development, Followership/Leadership
Capacity and Utilization Cycle time, lead time, Takt time, Capacity, Utilization
Major CI Strategies: Theory of Constraints; Lean / TPS; Six Sigma; Lean Six Sigma
Decision Making Models JDI, PDCA, DMAIC, Kaizen
Define: Voice of customer to metrics; Kano Model, KPIs/KBIs, Leading/Lagging Indicators; Develop problem and goal statements; SIPOC; Value Stream Mapping; A3, Project charters, RACI
Measure: Wastes (Mura/Muri/Muda); Gemba and Gemba Walks; Process Mapping and Spaghetti Diagrams; Central tendency and variance; Checksheets, Histograms, Scatter Plots, Pareto Diagrams, Box Plots, Run Charts
Analyze: Brainstorm and Affinity; Root Cause, Fishbone, 5 Why; Impact Effort Matrix; SPC (Central limit theorem, Control Charts overall, p-charts); Capability (Cp, Cpk, Pp, Ppk); Six Sigma Metrics (Defects/Defectives, PPM, Defect opportunities, DPU, DPMO)
Improve: Cost of Quality; Flow Chart and Swimlane Diagrams; Five S (5S); SMED
Control: Standard Work; Total Productive Maintenance; Poke Yoke and Jidoka

Table Two: Topics Covered in CB

Clarify the Problem
Project Selection and Scoping (Identifying the Problem, Defining Project Goals)
Initial Project Planning (Creating a Project Charter, Establishing a RACI Matrix)
Overview of A3 Problem-Solving (Purpose, Benefits, Structure)
Break Down the Problem
Problem Identification and Statement (Clarifying the Problem, Establishing Scope and Boundaries)
Voice of Customer (VOC) Analysis (Gathering and Analyzing Customer Feedback)
Current State Analysis (Value Stream Mapping, Process Flow Diagrams)
Target Setting
Establishing Clear Goals (Defining Desired Outcomes, Setting SMART Goals)
Baseline Measurement (Current Performance Analysis, Central Tendency and Variance)
Identifying Key Performance Indicators (KPIs) (Metrics to Track Progress)
Root Cause Analysis
Data Collection Techniques (Identifying Relevant Metrics, Designing Data Collection Plans)
Waste Identification (Mura, Muri, Muda Analysis)
Root Cause Analysis Tools (Fishbone Diagram, 5 Whys)
Develop Countermeasures
Hypothesis Development (Identifying Potential Solutions, Impact Effort Matrix)
Solution Development and Selection (Brainstorming, Affinity Diagrams)
Prioritizing Countermeasures (Evaluating Solutions, Selecting the Best Options)
See Countermeasures Through
Implementation Planning (Creating Action Plans, Flow Charting, SMED Techniques)
Pilot Testing (Testing Solutions, Gathering Feedback)
Adjustments and Refinements (Fine-tuning Solutions Based on Feedback)
Evaluate Results
Monitoring and Measuring Outcomes (Using Control Charts, Pareto Analysis)
Comparing Results to Targets (Assessing Improvement, Identifying Gaps)
Documenting Results (Creating Reports, Presenting Findings)
Standardize Successful Processes
Standardization of Solutions (Creating Standard Work Instructions, Poka-Yoke Techniques)
Developing Control Plans (Ensuring Sustainability, Total Productive Maintenance)
Knowledge Transfer (Training and Documentation for Continued Use)
Review and Reflect
Project Closure and Reflection (Documenting Lessons Learned, Final Project Presentation)
Reviewing the A3 Process (Evaluating Process Effectiveness, Identifying Improvements)
Celebrating Successes (Recognizing Team Efforts, Sharing Achievements)
Sustain Improvements
Embedding Changes into Daily Operations (Integrating Solutions into Standard Practices)
Continuous Monitoring (Regularly Reviewing Performance, Adjusting as Needed)
Ongoing Support (Providing Resources for Sustained Success)
Share Knowledge
Sharing Best Practices (Presenting Successful Strategies, Creating Knowledge Repositories)
Facilitating Workshops and Training (Educating Peers and New Team Members)
Promoting a Culture of Continuous Improvement (Encouraging Ongoing Innovation)

The prerequisites for each course were revised to ensure they were necessary. For CA, the only restriction now is that the student is an SCM major. It was determined that given the course is a fundamentals course and projects are not industry based, students could learn and apply the principles and tools regardless of prior experiences.

Three prerequisites were added to CB. One, an introduction to business course, is taken in the first year of study. Another, an introduction to SCM is taken during the second year of study. Thus, the first two prerequisites are readily met. The third prerequisite is the newly developed CA, which as discussed this provides the student with fundamental tools that enable them to hit the ground running in CB. Benefits that accrued to other stakeholders from the changes

in prerequisite requirements included simplified advising, ease of enrollment, more efficient long term planning of faculty teaching schedules and assignments, and the potential for increased complexity and scope of industry projects.

The changes have been positively received. For example, one student provided this feedback: "*[Dr. XX's]* course has been instrumental in preparing me to successfully continue on in my coursework within the SCM program and to enter into my career. The hands-on, project-based course allowed me to gain a clear understanding of what to expect in a career in SCM and gain the necessary skills and knowledge to complete the Lean Six Sigma Yellow Belt exam and earn the professional certification. The flipped hybrid format of the course allowed me the autonomy to learn the content at my own pace and gain a deeper understanding of the concepts when applied during in-class activities." Another student commented, "Professor XX clearly knows the material and makes sure every lecture is engaging. I like the activities we do in class that gets everyone involved and is more interactive than just listening and watching a lecture." Clearly there is room for improvement, as another student commented "The class seems a bit fast-paced for me due to the abundance of information to absorb. While I believe the current pace is appropriate, one aspect that I found beneficial and engaging in lecture videos is when they are segmented into 10-minute clips, even if it means having multiple videos per lecture. This method has previously enhanced my ability to retain information effectively."

One of our industry partners stated: "Engaging with the curriculum changes at the university has been a transformative experience for our organization. The integration of Lean Six Sigma principles and project-based learning not only enriched the skill set of graduates but also brought invaluable insights into our continuous improvement efforts. This approach bridges the gap between academic knowledge and practical application, preparing students for real-world challenges. Our collaboration has underscored the importance of industry-academia partnerships in fostering innovation and excellence in supply chain management. These projects are not just academic exercises; they are a catalyst for future leaders in our field."

An instructor of record for CB provided these insights: "The recent enhancements to our supply chain management curriculum, deeply rooted in AACSB best practices, have marked a significant milestone in our educational journey. As the instructor of record, I've witnessed first-hand the profound impact of integrating Lean Six Sigma methodologies and project-based learning. This paradigm shift has not only elevated the students' learning experience by aligning it more closely with industry standards but has also rejuvenated my teaching methods and those of my colleagues. The transformation has fostered a more interactive and engaging learning environment, where the theoretical and practical aspects of supply chain management intersect seamlessly. It's been incredibly rewarding to see students tackle real-world problems with confidence and creativity. Moreover, the collaboration with industry partners has enriched the curriculum, ensuring that our students are well-prepared for their future careers. This journey of continuous improvement has been a learning experience for us all, highlighting the symbiotic relationship between teaching, learning, and industry engagement."

Finally, the associate dean of the college commented: "One of the key objectives of the college of business is to support the expansion of real-world experiential learning for our students. It is particularly important for our nationally ranked programs, of which Supply Chain is one, to constantly monitor the skills and knowledge industry expects from our graduates. Based on the information learned from the marketplace, the Supply Chain program has made curriculum modifications, offered LSS Certification to our students, increased our industry partnerships in order to provide real-world projects in the classroom, and procured more internship and employment opportunities for our students. The administration has played a limited but supportive role in the positive changes to the program. The driving force for change has come from an engaged and expert group of faculty and a strong advisory board. Overall, with the leadership of top faculty in the college, the Supply Chain program continues to respond to the changing needs of the marketplace to ensure that their national-reputation for quality continues into the foreseeable future."

CONCLUSION

The best practices for curriculum developed recommended by the AACSB were followed to change the active learning experience in the continuous improvement courses of the supply chain management curriculum at a major midwestern university. Following these practices proved to be efficient and effective. Students more readily understand and thus apply the concepts, earn LSS yellow belt certification, and demonstrate their ability to solve real industry problems. Benefits realized by other stakeholders were streamlined registration and enrollment, strengthening of industry partnerships, recognition of trainings offered by the SCM Center, and rewarding teaching assignments for faculty. As more is learned, continuous improvement opportunities of the project based learning approach will be explored, such

as adding content to one or both courses to enable green belt certification, and restructuring the Try-Z experience to further enhance student problem solving skills.

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BIOGRAPHIES

Dr. Thomas V. Scannell is a Professor of Supply Chain Management at Western Michigan University. He earned his Ph.D. in Operations and Sourcing Management from Michigan State University, and his M.B.A. and B.S. Electrical Engineering from WMU. He is black belt certified in lean six sigma. He teaches supply chain, operations management, purchasing, strategy, quantitative analysis and quality management at the graduate and undergraduate levels. His publications have appeared in Decision Sciences Journal, Journal of Operations Management, Journal of Business Logistics, Sloan Management Review, Journal of Supply Chain Management, Journal of Product Innovation Management, Modern Management Science & Engineering, and The World Financial Review for example. He is co-author of two books, "Managing Supply Chain Risk: Integrating with Risk Management" and "New Product Development: Strategies for Supplier Integration". He is a co-founder of the Supply Chain Management Council of West Michigan. His experience in the aerospace and defense industry includes electronics design engineer, systems engineer, program/project manager and new product development manager.

Dr. Sime Curkovic is a Professor of Supply Chain Management and Lee Honors College Faculty Fellow at Western Michigan University. He received his undergraduate degree in Management Systems from GMI Engineering & Management Institute (now known as Kettering University). He received his Ph.D. degree from Michigan State University. Dr. Curkovic has taught several courses in sourcing, operations, logistics, multinational, and supply chain risk management. His research interests include environmentally responsible manufacturing, risk management, and strategic sourcing. Dr. Curkovic's publications have appeared and/or are under review in Supply Chain Management Review, the IEEE Transactions on Engineering Management, the Decision Sciences Journal, the Journal of Operations Management, International Journal of Production Research, and the Journal of Quality Management.

Peer Assessment of Information System Case Study Presentations by Students

Minsuk K. Shim, University of Rhode Island – Kingston, Rhode Island, USA
Sung J. Shim, Seton Hall University – South Orange, New Jersey, USA

ABSTRACT

The discipline of information systems management in business education aims to help students comprehend practical aspects of information systems in organizations. Real-world case studies are a common tool, often requiring students to present their analyses in class. However, assessing these presentations is challenging. This study explores peer assessment's role in evaluating information systems case study presentations, focusing on the organization, content, and communication aspects of presentations. The research questions inquire about the reliability of peer assessments of presentations, their correlation with course grades, and potential biases. Data was collected from graduate-level information systems students, using Likert-type scale surveys. Reliability analysis confirms the constructs' empirical reliability, and correlations between peer assessments of presentations and class grades are inconclusive. Despite student biases, peer assessment of presentations remains reliable. The study's results are expected to contribute to research on peer assessment of presentations, with practical implications for educators using real-world case studies and peer assessment of presentations.

Keywords: Peer assessment, in-class presentation, case study, information systems

INTRODUCTION

One of the primary concerns in the discipline of information systems is to help students understand the practical aspects of information systems used in organizations (Kerr et al., 2003). In fact, widely adopted information systems textbooks such as Laudon and Laudon (2020) and Pearson et al. (2019) make extensive use of real-world cases to help students understand how organizations use information systems. Also, courses in information systems often require students to study real-world cases of information systems and present their analyses and findings to the class as an important part of the coursework. However, it is difficult to assess the presentation of case studies of information systems by students. As an effort to complement the instructor's assessment, this study attempted to have students assess the presentation component of real-world case studies of information systems by their peer students.

The main purpose of this study is to examine the role of peer assessment in case study presentations with the following questions:

1. To what extent do students' peer assessments reliably evaluate presentations?
2. To what extent are students' peer assessments of presentations related to the grades they received in the course?
3. To what extent are students' own grades related to their peer assessments of presentations?

CONCEPTUAL BACKGROUND

The literature in presentations emphasizes the importance of a well-organized structure, clear content, and effective communication techniques. Presenters should focus on conveying a central message, using visual aids judiciously, and utilizing verbal and nonverbal communication to engage the audience and make their presentations more impactful. This study focuses on three aspects of presentations: (1) organization, (2) content, and (3) communication.

First, the organization is about how the presentation is structurally organized. Alley (2003) suggests that effective presentations often follow a clear structural framework, commonly referred to as the "Introduction-Body-Conclusion" structure. This framework helps presenters establish context, deliver key content, and reinforce the main message. Tufte (2006) highlights the significance of maintaining a clear hierarchy of information in presentation slides. This involves emphasizing key points and minimizing non-essential details to prevent cognitive overload. This study considers three items associated with the organization: (1) main points made clear, (2) presentation logically structured, and (3) material pertinent to the subject (not rambling nor excessive).

Second, the content is about how clear and informative the presentation is. Duarte (2008) underscores the need for a central, clear message in presentations. A focused and clear message increases audience engagement and retention. Simmons (2015) discusses the power of storytelling in presentations. Incorporating narratives and anecdotes can create an emotional connection with the audience and make the content more relatable. This study considers three items associated with the content: (1) clear language - technical terms explained simply, (2) well analyzed - not taken directly from the case or website, and (3) good range of information included (not too obvious nor too specialized).

Third, the communication is about how effective verbal as well as non-verbal communication in the presentation is. Booth-Butterfield (2002) investigates verbal delivery techniques. Effective use of tone, pace, and emphasis can enhance the presenter's credibility and capture the audience's attention. Mehrabian (1971) suggests that nonverbal cues, such as body language and facial expressions, play a significant role in conveying emotions and building rapport with the audience. Mayer and Moreno (2003) explore the use of multimedia elements in presentations. They suggest that well-designed visuals, such as diagrams and images, can enhance understanding and retention of complex concepts. This study considers three items associated with communication: (1) interesting and engaging manner (e.g., did not read from notes excessively), (2) helpful visual aids and/or multimedia, and (3) answered questions appropriately and completely.

DATA AND METHODS

Data for this study was collected from fifty-six students who took an information systems course at the graduate level. The same instructor taught three sections of the course in three semesters, respectively. The same course materials as well as the same real-world information system cases adopted from Laudon and Laudon (2020) were used in the three sections of the course. The survey questionnaire contained nine measurement items relating to each of the three constructs. Each item was measured by the extent of the student's agreement on the item as an assessor of the presentation. The extent of agreement on the items was measured using a five-point Likert-type scale (i.e., 1 – strongly disagree; 5 – strongly agree).

Three types of data analysis procedures were used to address the three research questions. The first question was addressed with reliability analysis: inter-rater reliability among assessors in terms of percent agreement and internal consistency reliability for the three constructs. The second question was examined using the correlational analysis between peer assessments and the final grade they received from the instructor. The third question was explored through an independent samples t-test to see the differences between students with higher grades and those with lower grades in their peer assessments. It is plausible that students receiving high grades are more likely to give high scores to presentations by other students (i.e., more likely to be "generous") or vice versa (i.e., more likely to be "stingy").

RESULTS AND DISCUSSION

Table 1 shows the descriptive statistics of the items considered. In general, students were quite generous in their ratings. Each student was reviewed by multiple reviewers and the average ratings on these items were reported in Table 1. Average ratings on all nine items ranged from 4.13 to 4.44. Students tended to give higher scores for the organization construct (especially for the items of "Main points made clear," and "Presentation logically structured") and lower scores for the communication construct (especially for the items of "Interesting and engaging manner," and "Helpful visual aids and/or multimedia"). In addition, there was more variability in the communication construct and less variability in the organization construct among presenters.

Two types of reliability analyses were done to denote the agreement among assessors using the rating scales and overall reliability of the constructs. Table 2 shows the descriptive statistics of percent agreement of the items. Using a more relaxed criteria for agreement (allowing one score point difference), percent agreement ranged from 83% to 94%, indicating a high level of inter-rater reliability. Table 3 shows the overall reliability of the three constructs, which was found to be moderately high. This provides support for empirically reliable constructs to be used in peer assessment of presentations of information systems case studies by students.

The second research question asks the criterion-related validity of peer assessments of presentations: whether students' peer assessments of presentations are correlated to the instructor assessment of presentations. The correlations between the average peer assessment scores and the overall class grade were not statistically significant (ranges from .07 to .09, $p > .05$). This surprising result may come from the fact that case study presentation is only

a part of overall course grade. It was also inconclusive as we examined the correlation between peer assessment of case study presentations and overall class grade rather than instructor assessment on the case study presentations. This is one of the limitations of this study and it would be informative to expand this study in the future examining the direct relationship between peer assessment and instructor assessment of presentations.

Table 1: Descriptive Statistics of Average Item Ratings (Score)

Construct and items	N	Min.	Max.	Sum	Mean	Std. Dev.
Organization						
Main points made clear	54	3.71	4.87	238.81	4.4224	0.2679
Presentation logically structured	54	3.82	4.86	239.55	4.4360	0.2496
Material pertinent to the subject	54	3.67	4.93	236.10	4.3721	0.2556
Content						
Clear language	54	3.00	4.80	234.48	4.3422	0.3447
Well organized	54	3.43	4.75	233.51	4.3242	0.2702
Good range of information	54	3.71	4.86	234.98	4.3514	0.2657
Communication						
Interesting and engaging manner	54	2.95	4.67	222.91	4.1279	0.3792
Visual aids and multimedia	54	3.40	4.69	225.19	4.1701	0.3014
Answered questions appropriately	54	3.67	5.00	238.16	4.4104	0.3077

Table 2: Descriptive Statistics of Average Item Ratings (Percent)

Construct and items	N	Min.	Max.	Sum	Mean	Std. Dev.
Organization						
Main points made clear	54	66.70	100.00	5083.30	94.1360	8.2428
Presentation logically structured	54	66.70	100.00	5039.50	93.3240	8.5372
Material pertinent to the subject	54	66.70	100.00	4900.00	90.7410	9.1738
Content						
Clear language	54	63.60	100.00	4863.90	90.0730	8.8463
Well organized	54	60.00	100.00	4797.60	88.8450	10.0761
Good range of information	54	70.00	100.00	4948.60	91.6410	8.7941
Communication						
Interesting and engaging manner	54	62.50	100.00	4565.20	84.5410	10.1169
Visual aids and multimedia	54	55.60	100.00	4488.90	83.1270	11.8586
Answered questions appropriately	54	55.60	100.00	4913.80	90.9970	10.3306

Table 3: Reliability of Constructs

Construct	No. of Items	Cronbach's Alpha
Organization	3	0.785
Content	3	0.785
Communication	3	0.674
Total	9	0.890

The third research question addresses the bias of the student who rates. In other words, students who receive higher grades from the instructor tend to be more generous to the presentations by other students and students who receive lower evaluation from the instructor tend to be stingier in their peer evaluation of presentations. We classified students into two groups based on their overall grade and then compared their peer assessments of presentations. There was no significant difference between students with higher grades and students with lower grades in their peer assessment of presentations by other students ($t = 1.003$, $p > .05$). This provides support that peer evaluation of

presentations does not suffer from bias of students who rate and therefore a reliable and effective way of assessment of presentations.

IMPLICATIONS FOR BUSINESS EDUCATION

Effective presentations are a crucial component of business education as they help students develop essential skills for successful communication in the corporate world. The organization, content, and communication aspects of presentations play significant roles in shaping the learning experience and preparing students for real-world challenges. First, teaching students how to organize their presentations coherently ensures that their ideas are presented logically and are easy to follow. This skill is crucial for conveying complex business concepts to various stakeholders. Second, encouraging students to include relevant, well-researched content helps them build a foundation for making informed business decisions. This aspect teaches students the importance of thorough research and critical thinking. Third, teaching students to use their voice, tone, body language, and eye contact effectively enhances their ability to convey confidence and credibility during presentations - a vital skill for business professionals. Overall, the organization, content, and communication aspects of presentations in business education have far-reaching implications.

CONCLUSION

This study attempted to have students assess the presentation component of real-world case studies of information systems by peer students in a graduate information systems course, to examine the role of peer assessment in case study presentations. The results provide support for the three constructs used in this study – organization, content, and communication as being empirically reliable. The results also suggest that peer evaluation of presentations does not suffer from bias of students who rate and therefore a reliable and effective way of assessment of presentations. On a theoretical level, the results would help contribute to studies on the use of real-world case studies of information systems as well as studies on peer assessment of presentations by students. On a practical level, the results would be helpful to those instructors who consider using real-world case studies of information systems and adopting peer assessment of presentations in their courses. Taken together, this study is expected to contribute to extending the line of empirical research on the use of student peer assessment of presentations in information systems and business courses.

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Minsuk K. Shim, Ph.D., is an associate professor at the University of Rhode Island – Kingston, Rhode Island, USA, teaching both undergraduate and graduate courses in educational psychology, measurements, and research methods. Her interests and expertise in quantitative research methods have been applied in educational policy research on educational reforms, assessment, science education, business education and instructional technology.

Sung J. Shim, Ph.D., is an associate professor of computing and decision sciences at Seton Hall University – South Orange, New Jersey, USA. His research interests include information technology implementation, business process reengineering, and computer simulation.

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Teaching Business Analytics: Do Dogs Know Calculus?

Robert C. Forrester, Midwestern State University, Wichita Falls, TX, USA
John E. Martinez, Midwestern State University, Wichita Falls, TX, USA
Mike C. Patterson, Midwestern State University, Wichita Falls, TX, USA

ABSTRACT

As data storage and gathering have become more available and less expensive, the demand for employees and managers with the skills to analyze, interpret, and provide business guidance with the data has increased. Universities and colleges are increasingly adding programs to teach students these skills. Students are increasingly caught up in the specific programming in the courses and need to improve in mastering the critical thinking skills needed for analysis techniques. This paper presents a standard puzzle as a classroom example of how to solve an optimization problem. In Tim Pennings' article, "Do Dogs Know Calculus? Pennings assures that his corgi, Elvis, does not. However, the clever title introduces humor and fun into the business analytics classroom. This paper aims to present a software mathematical model of the ball-retrieving, distance-minimizing dog problem of retrieving a tossed object into the water and solving the problem with critical thinking and software.

Keywords: puzzles, mathematical modeling, optimization, solver, spreadsheet, Lingo, PBL

INTRODUCTION

As data storage has become more inexpensive and through enhanced data collection, businesses and managers can know more about their businesses and make better decisions. Peter Drucker and W. Edwards Deming emphasized, "You can't manage what you can't measure," or, more importantly, Deming showed us how to manage through various statistical procedures. The demand for employees and managers with the skills to extract useful information from this data has increased, and there is a need for more employees with these skills (Deming, 1991; Drucker, 2012; Aasheim, Williams, Rutner & Gardiner, 2015; McAfee, Brynjolfsson, Davenport, Patil & Barton, 2012; Persaud; 2021).

'Big data' refers to large and complex datasets requiring advanced analytical techniques and technologies to capture, store, manage, search, share, analyze, and visualize (Chen, Chiang & Storey, 2012). This paper focuses on teaching the analyzing or critical thinking component in classrooms as universities and colleges struggle to create degrees, programs, and courses in data analytics and business analytics.

Many authors have explored the use of puzzles in university classrooms (Agbo, Okpanachi, Ocheja, Oyelere & Sani, 2024; Forrester, Patterson & Friesen, 2022; Levitin & Papalaskari, 2002; Patterson, Martinez & Forrester, 2023). Levitin and Papalaskari (2002) find that courses on design and analysis should be organized around design techniques that incorporate puzzles for showcasing design strategy. In this paper, we specifically address the problem of using puzzles as an example of teaching critical thinking concepts necessary to perform design strategy and analysis.

LITERATURE REVIEW

This part of the study highlights related readings, laying down essential concepts established in previous studies or writings of experts in teaching introductory business and data analytics with puzzles to gain a successful mastery of design and analysis techniques.

The opportunities and challenges for big data analytics in US higher education are examined by Attaran, Stark, and Stotler (2018). The authors recognize the need by business leaders worldwide to capitalize on emerging technologies and compete effectively in a digitally driven world. The authors examine the reliance on data analytics to accelerate time to insight and gain a competitive advantage in consumer wants and needs and the disconnect with higher education to provide labor with the needed skills as the topic is still new. The challenges of teaching big data are complex, and there are many ways to address accessing the data and teaching the students.

The algorithms used to study big data often must be clarified for beginning students. Mosvold (2005) examines this issue and determines that a successful method to address the concern is connecting mathematics to real-life, everyday

scenarios. Much of his research is based on how mathematics should be taught not as a mental discipline but as a way of life and living. Thus, an essential aspect for teachers is to consider developing realistic and relevant mathematical problems. As we examine "Do dogs know calculus?" it is essential to consider Mosvold's "realistic materials" in his description as situations, problems, and activities that are appropriately connected to real life while still following curriculum standards.

An attractive component Bradbury (2016) addresses is attention span during lectures. Bradbury's review finds that the problem may be something other than students but the teacher and how the material is presented. His collection reflects that even the "most interesting material can be presented in a dull and dry fashion, and it is the instructor's job to enhance their teaching skills to provide rich content and a satisfying lecture experience for the students."

Levitin and Papalaskari (2002) examine puzzles using teaching algorithms and find that puzzle-like problems can help illustrate most general algorithm design techniques such as brute force, divide-and-conquer, dynamic programming, and others. The authors also call for more puzzles to be found in existing collections and utilized for this worthy purpose.

Previous authors have found that teaching puzzles in the classroom enhance learning and can be beneficial to students as they apply for employment in industry, particularly by firms that utilize puzzles in assessing potential employee's problem-solving and lateral thinking skills (Agbo, Okpanachi, Ocheja, Oyelere & Sani, 2024; Forrester, Patterson & Friesen, 2022; Levitin & Papalaskari, 2002; Patterson, Martinez & Forrester, 2023). Forrester, Patterson, and Friesen (2022) provide examples of a puzzle to address problem-based learning (PBL) to increase knowledge and understanding.

This paper aims to present a standard puzzle and software mathematical models of the ball-retrieving, distance-minimizing dog problem described as an example of puzzles as a PBL classroom learning technique.

MATHEMATICAL ANALYSIS IN CANINES DETERMINING THE FASTEST ROUTE

Elvis is a Welsh corgi that has been the subject of much mathematical analysis and discussion since his owner, mathematician Tim Pennings, introduced him to the world (Peterson, 2006). Pennings (2003) discussed how he observed Elvis's routine for retrieving a ball tossed into the water in his widely cited paper.

While observing, Pennings noted that Elvis would not enter the water from the point that Pennings would toss the ball, which would have meant swimming the longest possible distance to retrieve the ball. Likewise, Elvis would not run to the point representing a 45º angle turn to enter the water. Instead, Elvis would run some distance, close to but just short of the 45º entry point, and then enter the water. The observation led Pennings and a colleague to conduct an experiment involving tossing the ball and calculating Elvis's swimming and running time and the water entry point. Ever the mathematician, Pennings had something of an "Aha" moment when it struck him that Elvis was demonstrating behavior, which might lead one to believe the dog understood some fundamental calculus concepts, notably the optimization of a function. In this case, the minimum time to the floating ball. Pennings and his colleague calculated the optimal entry point using calculus and conducted several "toss, run, and swim" trials.

While Elvis never entered at the precise optimum point, he did enter remarkably close enough for Pennings (2003) to conclude that Elvis' behavior is an example of the uncanny way nature… often finds the optimal solution."

BASIC MODELS

The basic model of a retrieving dog, which can swim, is standing on the shoreline of a lake with its owner. The owner tosses a ball at an angle some distance into the water. In our example, we use fifty feet down the shoreline and thirty feet into the water. The dog will retrieve the ball.

A model of a dog that chooses to enter the water when the ball is thrown

This entry point will minimize the total distance. However, since the dog can run at a much higher speed than he can swim, the total time for the ball is relatively high. In our model, we chose a running time of twenty miles per hour and a swimming time of 1.6 miles per hour. The running time of 20 mph was chosen after reviewing several papers regarding dogs and their attributes. Speed will depend upon numerous factors, including breed, size, weight, and age.

According to Snow & Harris (1985) and Boehn (2024), the fastest dog breed is the greyhound, which can reach speeds exceeding forty miles per hour. The authors settled on 20 mph as a reasonable speed, utilizing both the half speed of the greyhound and citing the average speed of 19 mph for all breeds (Denny, 2008).

The swimming speed was set to 1.6 mph. This speed was based on the speed of a world record-holding Labrador greyhound stray named Umbra, featured in a National Geographic Explorer story, which averaged 3.29 mph for a remarkable four miles (Faye, 2013). For the short burst of retrieving the ball ½, the speed of the world record-holding dog seemed reasonable. Also, since this was the same average speed Pennings had used in his initial study, 1.6 mph was chosen.

A model of a dog that prefers swimming to walking
The dog enters the water at the point where the ball is tossed. Swimming the straight-line distance of 58.31 feet to the ball requires almost 25 seconds.

A model of a dog that prefers running to swimming
He runs to the point where water entry occurs at a perfect 45º angle and thus minimizes the swimming distance. Running time is 1.705 seconds and swimming time is 12.784 seconds for a total time to the ball of 14.489.

The optimizing dog
The optimizing dog, which attempts to minimize the total time to the ball, will do neither of the options. He will do something close to what is discussed in the Mathematical Model section below.

MATHEMATICAL MODEL

The objective is to find the value RunFt, which will be the water entry point for the dog, which minimizes the variable SumTime. SumTime is the total running and swimming time to the ball.

RunMPH = 20
SwimMPH = 1.6
FeetWest = 50
FeetVert = 30
RunFtSec= RunMPH*(22÷15)
SwimFtSec = SwimMPH*(22÷15)
RunTimeSecs = RunFt÷RunFtSec
SwimTimeSecs = SwimFt ÷ SwimFtSec
$SwimFt= SQRT(FeetVert^2+(FeetWest-RunFt)^2)$
SumTime = RunTimeSecs+SwimTimeSecs

Objective: Minimize: SumTime

Subject To: RunFt<=FeetWest

SOFTWARE MODEL FORMULATION

Two widely used software tools were utilized to develop the model. The first approach utilized the Lingo software tool developed by Lindo Systems.
Other optimization software available through Lindo includes "What's Best" and "Lingo" (Lindo Systems, n.d.). The Lingo software formulation is displayed in Figure 1. As the display illustrates, the Lingo Software tool allows for a model formulation similar to the general model formulation discussed previously.

Figure 2 displays the Lingo optimization output. As indicated in Figure 2, the optimal water entry point for the retrieving dog is 47.59228 feet. This will result in the dog running for 1.6225 seconds. The resulting swimming time and feet are 30.09646 feet and 12.8252 seconds, respectively. The minimized total time to the ball is 14.44766 seconds.

Figure 1: Lingo Mathematical Formulation of Canine Optimizing Behavior

```
Model:
Min = SumTime;
RunMPH = 20;
SwimMPH = 1.6;
FeetWest = 50;
FeetVert = 30;
RunFtSec= RunMPH*(22/15);
SwimFtSec = SwimMPH*(22/15);
RunTimeSecs = RunFt/RunFtSec;
SwimTimeSecs = SwimFt/SwimFtSec;
SwimFt= @SQRT((@SQR(FeetVert))+(@SQR(FeetWest-RunFt)));
SumTime = RunTimeSecs+SwimTimeSecs;
RunFt<=FeetWest;
END
```

Figure 2: Lingo Model Output of Canine Optimizing Behavior

Local optimal solution found.
Objective value: 14.44766
Infeasibilities: 0.1776357E-14
Extended solver steps: 5
Total solver iterations: 74

Variable	Value	Reduced Cost
SUMTIME	14.447660	0.000000
RUNMPH	20.000000	0.000000
SWIMMPH	1.600000	0.000000
FEETWEST	50.000000	0.000000
FEETVERT	30.000000	0.000000
RUNFTSEC	29.333330	0.000000
SWIMFTSEC	2.346667	0.000000
RUNTIMESECS	1.622464	-0.1455735E-07
RUNFT	47.592280	0.000000
SWIMTIMESECS	12.825200	0.000000
SWIMFT	30.096460	0.000000

Row	Slack or Surplus	Dual Price
1	14.44766	-1.000000
2	0.000000	0.8112254E-01
3	0.000000	8.014915
4	0.000000	-0.3409263E-01
5	0.000000	-0.4247705
6	0.000000	0.5531082E-01
7	0.000000	5.464714
8	0.000000	-1.000000
9	0.000000	-1.000000
10	0.000000	-0.4261364
11	0.000000	-1.000000
12	2.407717	0.000000

The second software formulation utilized the Microsoft© Excel Solver add-in tool Solver, which Frontline Systems developed. Frontline Systems is one of the industry leaders in developing advanced optimization software (Solver, n.d.).

The initial spreadsheet formulation of the model is displayed in Figure 3. The spreadsheet formula view of the model is displayed in Figure 4. The Solver parameters are displayed in Figure 5. Figure 6 displays the model output. Model results match the Lingo output, with a suggested water entry point of 47.5922 feet and a total time to the ball of 14.44766 seconds.

Figure 3: Initial Solver Spreadsheet Formulation Canine Optimizing Behavior

1\A	B	C
2		
3	MPH Running	20.0
4	MPH Swimming	1.6
5		
6	Run Ft/Sec.	29.33333333
7	Swim Ft/Sec.	2.346666667
8		
9	Ft. Ball West from Thrown	50
10	Ft. Ball Vertical from Shore	30
11		
12	Running Time (Secs.)	1.704545455
13	Swimming Time (Secs.)	12.78409091
14	Sum Time (Secs.)	14.48863636
15	Ft. to Run (Optimum Turning Point)	50
16	Ft. to Swim	30

Figure 4: Formula View of Solver Spreadsheet Formulation Canine Optimizing Behavior

1\A	B	C
2		
3	MPH Running	20
4	MPH Swimming	1.6
5		
6	Run Ft/Sec.	=C3*(22/15)
7	Swim Ft/Sec.	=C4*(22/15)
8		
9	Ft. Ball West from Thrown	50
10	Ft. Ball Vertical from Shore	30
11		
12	Running Time (Secs.)	=C15/C6
13	Swimming Time (Secs.)	=C16/C7
14	Sum Time (Secs.)	=SUM(C12:C13)
15	Ft. to Run (Optimum Turning Point)	50
16	Ft. to Swim	=SQRT(C10^2+(C9-C15)^2)

Figure 5: Spreadsheet Solver Parameters Canine Optimizing Behavior

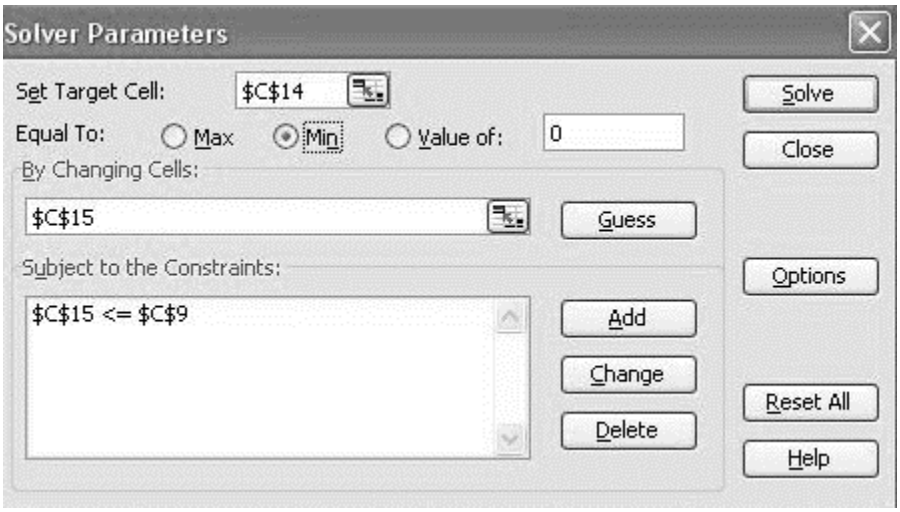

Figure 6: Optimum Solver Spreadsheet Canine Optimizing Behavior

1\A	B	C
2		
3	MPH Running	20.0
4	MPH Swimming	1.6
5		
6	Run Ft/Sec.	29.33333333
7	Swim Ft/Sec.	2.346666667
8		
9	Ft. Ball West from Thrown	50
10	Ft. Ball Vertical from Shore	30
11		
12	Running Time (Secs.)	1.622464168
13	Swimming Time (Secs.)	12.82519744
14	Sum Time (Secs.)	14.44766161
15	Ft. to Run (Optimum Turning Point)	47.59228227
16	Ft. to Swim	30.09646332

SUMMARY

This study intended to explore the unique way of teaching critical thinking and PBL through realistic examples that incorporate exciting ways for students to stay focused and master problem-solving design and optimization. More specifically, we seek to use a common puzzle to address critical thinking examples in optimization.

It is a curious question after reading about Elvis and how he, over repeated trials, appeared to be attempting to minimize the total time to retrieve a tossed ball. While it might appear to many that optimization is reserved for the human race, that assumption might be challenged. Observations of animals of prey stalking and hunting present a similar scenario to a dog running and swimming to retrieve a ball. As Minton and Pennings (2007) concluded, "Elvis knows bifurcations qualitatively, but not quantitatively." The techniques explored in the classroom provide interesting optimization solutions to everyday observation that allow students to input problem-solving techniques that are transferable to real-world problems in business and industry. The possession of these skills may enhance their fundamental problem-solving and skills in software adaptation.

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Robert C. Forrester is the Chair of Economics and Finance and the Dillard Distinguished Professor of Energy Finance at Midwestern State University.

John E. Martinez is a professor of Economics at Midwestern State University. Dr. Martinez has been teaching economics and quantitative courses for more than 50 years.

Mike C. Patterson is a professor of operations management at Midwestern State University. Dr. Patterson has been teaching operations and quantitative methods for 45 years.

Towards a Model Accounting Curriculum

Michael S. Wilson, PhD CPA

ABSTRACT

The purpose of this descriptive paper is to describe how accounting curriculums can align with an Accounting Information Systems degree based on the CPA evolution model curriculum. The paper explores how changes in professional competencies are aligned with current curriculum that spans different academic disciplines.

Labor experts have predicted that a coming wave of automation and digital technology upending the work force was coming and is turning into reality. In part due to the COVID-19 outbreak that rapidly changed the workplace with millions of Americans moving their workspaces to their homes as employers offer flexible work arrangements, such as teleworking. The pandemic destroyed some jobs while altering how and where work is done for nearly everyone. Estimates of over half of Americans are working from home, tethered to their employers via laptops and Wi-Fi, up from 15 percent before the pandemic, according to a recent MIT study. In the coronavirus economy, companies are adopting more automation, as they seek to cut costs and increase efficiency. These workplace changes have influenced the core competencies of accountants driving accounting degrees towards Accounting Information System skills.

Key words. Accounting Information Systems, CPA Evolution Model Curriculum, Accounting skill competencies.

AICPA CORE COMPETENCY FRAMEWORK

The AICPA accounting education executive committee charged a special task force to develop a competency-based framework that would prepare students for entry in the profession. This effort called the CPA Vision Process was a profession wide initiative. The framework focused on the skills and competencies – not specific topics, subjects or a common body of knowledge. Committee members recognized the competencies were broader than what was on the CPA exam by identifying all the competencies necessary to everyone entering the profession.

The AICPA framework was developed by educators and accounting professionals to define a set of skills-based competencies of students entering the accounting profession need, regardless of their chosen career path (public/industry/government/not-for-profit), or for the specific accounting services they'll eventually perform. Due to the rapidly changing accounting profession, the framework focuses on critical skills instead of traditional subject-content areas or accounting services. Although knowledge requirements will change with time, the core set of competencies the framework identified were designed to have long-term value to support a variety of career opportunities for future CPAs (AICPA). The competency framework includes three pillars: accounting competencies, business competencies and professional competencies.

Accounting competencies are related to risk assessment, researching standards and documenting business processes, while business competencies are strategic featuring an understanding of the legal and regulatory environment with a keen sense of internal controls. Finally, the professional competencies that features an ethical mindset valuing collaborative approaches and professional judgement in decision-making to help navigate new territory.

The purpose of this paper is to highlight additional competencies that superseded this work. The more recent work, released in 2021, is called the CPA evolution model curriculum (CPAEMC). The recommendations identified represent a paradigm shift focused on aligning education and licensure goals with skills needed in today's business environment.

THEORETICAL FOUNDATION

The theoretical foundation of this paper is the CPA evolution model curriculum (CPAEMC) released in 2021 by the National Association of State Boards of Accountancy (NASBA) and the AICPA. The model curriculum is a roadmap for an accounting program designed to prepare graduates for the type of work that they will be doing in the first two years of their accounting careers. The CPAEMC serves as a starting point for how schools can re-imagine their curricula. The curriculum appears to be a clear call for developing an Accounting Information Systems degree as the flagship degree in the accounting department.

RECENT TRENDS

Under the CPA Evolution model, CPA candidates will all take three core sections which will test their knowledge in the areas of accounting, audit, and tax/regulation while recognizing ways that technology has impacted these areas. Afterwards, students will take an exam section in their choice of one of three disciplines: tax compliance and planning (TCP), business analysis and reporting (BAR) or information systems and controls (ISC). The AICPA anticipates rolling out a new version of the CPA exam based on this model in 2024.

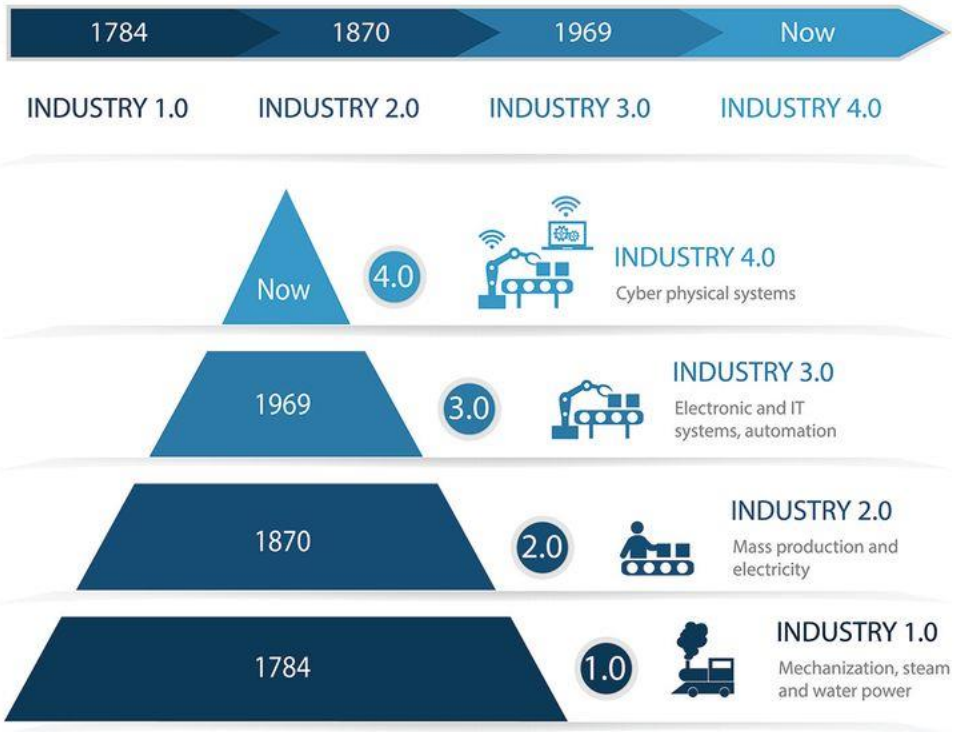
Some of the material in the ISC discipline might be covered in computer science or management information systems classes. This may inspire accounting departments to work collaboratively with the MIS or Computer Science departments.

Every now and then major shifts remap the economic landscape creating opportunities for some but also swallowing jobs and communities for others. Some suggest we currently are experiencing this period right now. The accounting profession has seen firms valuing IT over accounting skills. Consider Price Waterhouse Coopers where starting positions in the audit field pay on average $50,000 while cybersecurity starting wages are $80,000. The goal of the CPAECM is to align education and the CPA exam with what's really happening in practice today.

HISTORICAL CONTEXT

According to Klaus Schwab, founder of the World Economic Forum, we're already in a period called the Fourth Industrial Revolution that features artificial intelligence, digital technology and advancements in automation that represent paradigm shifts across many industries. The World Health Forum has recognized a 4th industrialization as depicted in the following graph.

Figure 1



The Fourth Industrial Revolution is already underway. Image: Shutterstock

The pandemic is accelerating structural shifts in the economy that were already underway, such as using digital channels to reach consumers, automating operations, and allowing people to work remotely from home. Moreover, some shifts in consumer behavior and demand for new types of work may outlast the current public health crisis. Preparing for the "future of work" has gone from a distant hypothetical to a very immediate priority. These changes are also being experienced in the accounting profession. One trend has been the move towards valuing Accounting Information Systems degrees and backgrounds.

ACCOUNTING INFORMATION SYSTEMS

It is paramount that an undergraduate accounting information systems (AIS) curriculum is kept up to date with changing technological developments. Business competencies require an understanding of the accounting system. Many aspects of accounting practice have been changed fundamentally by information technology (IT), including financial reporting, managerial accounting, auditing, and taxation. An accountant's role in the analysis and design, evaluation and use of information systems has been expanded and become more complex as the IT revolution moves forward. This development makes it even more essential for accounting students to understand IT architecture, develop proficiency in application software, understand the processing of transactions by AIS, develop familiarity with system development methodologies, understand IT controls and be aware of newly developing technologies.

CHALLENGES WITHIN ACCOUNTING INFORMATION SYSTEM PROGRAMS

Overall, business school curriculums continue to suffer from results reported in Groomer & Murthy (1996) that revealed a lack of consistency in the AIS curriculum across the responding institutions. The authors attributed this to a lack of authoritative guidance regarding the topics to be covered in an AIS subject and the varied backgrounds of coordinators teaching the subject. This made the subject content extremely diverse. The authors emphasized the importance of AIS coordinators having a background as professional accountants in order to reduce the diversity of the subject and enhance its AIS focus.

The exceptions appear to be database software, enterprise resource planning systems, enterprise resource planning software, expert systems and spreadsheet software. Academic sources indicate that accounting professionals cover more theoretical, business-oriented topics, with more accounting related assignments. In contrast, IT professionals cover topics in their AIS subject with a more technical emphasis and assign more technical assignments.

ACCOUNTING INFORMATION SYSTEM CONCENTRATIONS

Degrees or concentrations in Accounting Information Systems (AIS) are characterized by content in traditional accounting courses, programming, and cybersecurity. AIS degrees prepare students to understand the intricacies of the accounting profession while delving into the technology that helps businesses run. Many students learn to develop industry specific software and some programs also cover IT management. Students pursuing a degree in AIS may complete a core accounting curriculum before branching into technology-specific coursework like programming and databases. Students can complete an AIS degree at the bachelors or master's level. Students usually complete a diverse curriculum that consists of core requirements, electives, internships, and capstone projects.

ACCOUNTING INFORMATION SYSTEM CHARACTERISTICS

According to ***the AICPA information technology curriculum model*** includes the following three features in addition to accounting knowledge.

1. Demonstrate knowledge of information security and cyber risks.
    - Students should demonstrate a fundamental understanding of cybersecurity risk management and the major threat vectors for systems, including cyber adversaries, the cybercrime economy, and common types of attacks. They should possess knowledge pertaining to data breaches and their impact on information privacy, as well as how to manage system vulnerabilities.

    - Students should demonstrate an understanding of the AICPA's Cybersecurity Risk Management reporting framework (SOC for Cybersecurity), including report content, target users, and uses of the report in conjunction with an entity's overall cybersecurity risk mitigation strategy.
2. Demonstrate an understanding of business intelligence, data management and analytics.
    - Students should possess knowledge of the information lifecycle, from identification of system information through destruction, and the various types of infrastructures and ERPs to support data. Students should understand how data is collected and manipulated, including the consolidation, cleaning, transformation, reduction, and processing of data. Students should demonstrate an understanding of data governance and its objectives, strategy, and policies.
    - Students should understand the various types of data analytics, including the tools and procedures to perform an analysis, and the methods of reporting and performance indicators. They should possess knowledge of predictive analytics, including the various models and techniques used in the application and deployment of

predictive analytics. Students should also be familiar with the integration of analytics in the audit process. Students should be aware of prescriptive analytics and the resulting automation of selected decisions.

- Lastly, students should possess a fundamental understanding of business intelligence management, including the various types of digital transformation and technology disruptors and the usage of data integration and data warehousing.

3. Demonstrate knowledge pertaining to IT governance, risks and controls.
    - Students should understand the objectives and principles of IT governance, including key components and best practices. Students should be familiar with common IT governance roles, responsibilities and accountabilities and possess knowledge of the IT governance implementation process.
    - Students should have knowledge of the primary IT related risks and how to effectively identify, assess and mitigate the risks. They should be familiar with various IT frameworks, including COSO and COBIT, and the integration of frameworks with IT assessments. Additionally, students should understand how to determine key control areas for IT assessments, including ITGCs, application, business process, and change management controls.
    - Lastly, students should possess knowledge of the types of System and Organization Controls (SOC) Reporting, the purposes for SOC reporting, the users of SOC reports, and the responsibility of user auditors.

Many of these skills are offered by accounting departments as an accounting information system concentration. The main learning objective is to familiarize students with large-scale financial reporting and capital market information databases and to improve student's quantitative analytical and problem-solving skills in conjunction with these data. These skills, in addition to accounting knowledge, can help prepare students to understand the intricacies of the accounting profession while delving into the technology that helps business run. Students can learn to develop and maintain industry-specific financial software by completing the core accounting curriculum before branching into technology specific work.

A COMPETENCY MODEL OF TEACHING

A competency approach supports a way of IS undergraduate program design where the focus is on what graduates can do, rather than what they know. As an expression of learning objectives, and as a composition for learning outcomes, competency models provide a clearer link between the expectations that a program has for its students, the expectations of students, and the expectations of stakeholders.

The CC2020 taskforce has found that key IS competencies across all IT realms reflect three key elements that define a competency: knowledge, skills, and dispositions. The knowledge component includes core concepts of the discipline of study, the skills component includes the ability to develop and refine skills via "hands-on" practice and activity, while the disposition component has to do with attitude, behavior, social skill and emotional capabilities. Expressing competencies using these components should lead to stronger guiding principles in bettering graduates' skills for the workplace and make for improved curriculum design.

Topi (2019) list the following benefits of a competency-based approach:

- Competencies to focus on what the students need to learn, not what educators need to teach.
- Competencies to effectively communicate expectations of graduates to external stakeholders.
- Competencies to encourage reflection on student learning - Competencies can be used globally in diverse contexts.
- Competencies to fit well with most accrediting agencies that use an outcome-focused approach.

These benefits may be of increasing value, as education is moving towards new trends and forms: education itself is changing. One example of recent trends in IS undergraduate curricula is the emergence of online learning and Massive Open Online Courses (MOOCs). Some IS curricula have included study abroad segments as a mandatory part of the program to expose students to a variety of (work) cultures. Several universities have successfully included experiential learning components into their curricula, to expose students to real world environments and to better prepare them for the workplace. Furthermore, some universities have adopted a modular approach to the undergraduate degree in terms of course topics and credits where students can cover a significant part of their degree with transfer credits originating from other recognized programs. These include advanced placement courses, courses from community colleges and polytechnics, industry training modules, or evidence of relevant practical experience.

This acknowledges that the conclusion of a baccalaureate often marks the ability to start on a path of life-long learning where learning-through-doing in a practical and professional context will continue and extend beyond the academy. Skills are the verbs in competency-task statements that suggest the approach to the application of knowledge.

PLANNING FOR THE CPA FIRM OF THE FUTURE

The core competencies required of accounting are likely to change for accountants. New model curriculums are being explored. Some experts are predicting that accounting firms will need to hire privacy and cybersecurity experts and computer systems experts with data feeding automatically into systems. Evaluating every transaction and flagging ones that should be monitored will drive demand for people who can test the system.

One opportunity niche that is emerging is the relationship technology has with the human connection recognizing there often is a lack of training and that technology stresses some people out. Training may become an important future practice opportunity. Processes need to be mapped to ensure understanding and evaluated before adopting technology solutions, recognizing that ongoing training and analysis are needed. The first step organizations can take to recognize the significance of these times is a move towards recruiting AIS majors.

HUMAN RESOURCES CONSIDERATIONS

Every single team member needs to be thinking about the technology which reflects continuous learning and critical thinking. Individual professional development plans that incorporate embracing technology seems logical for firm personal policies. Recognition that streamlined technology and efficient processes is a call for more dynamic roles is leading to a paradigm shift in preferring AIS majors with a basic computer science coursework, advanced statistics and/or data analytics. Many young professionals are entering a world in which the Internet of Things (IoT) has created this pervasive hyper-connected computing environment, and the associated societal, industrial, and scientific practices, and human values are in flux, collectively changing how data, knowledge, and innovation are currently produced and consumed. Not only humans and other living organisms but virtually any object, animate or inanimate, are connected to the IoT and "talk" to each other through sensors and wireless connectivity, tracked in real-time, and in a state of constant learning from the Big Data they are generating and consuming at the same time. In a period of change, the idea of accounting programs moving to AIS degrees seems congruent and consistent with the future.

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Michael S. Wilson is a long-term accounting faculty having appointments at many universities in the United States. He is also a licensed CPA and continues to practice accounting primarily as a non-profit auditor. He tries to bridge theory and practice and his research interests are describing how accounting is practiced.

A Case of Financial Ratios That Can Inadvertently Mislead

Martin Gosman, Wesleyan University, Middletown CT, USA
Mathius Gazi, Wesleyan University, Middletown CT, USA
Akiva Lind, Wesleyan University, Middletown CT, USA

ABSTRACT

In this case, a new investment group selects Burlington Stores as the off-price retailer to include in its stock portfolio, impressed with Burlington's reporting of a much higher gross-profit percentage than that of its peers and the firm's 443% return on stockholders' equity (ROE), fifth highest among the *Fortune 500.* After observing one year later that Burlington's stock performance was similar to that of its peers, Ross Stores and TJX, the group considers the factors that could have falsely suggested superior earning power on behalf of Burlington. In the process, they come to realize the challenges that can exist when comparing firms on the basis of their gross-profit percentages and returns on stockholders' equity. In a teaching note that follows, questions enable students to revisit key points raised in the case as they examine financial-statement disclosures for fourteen additional retailers.

Keywords: ratio comparisons of firms, gross-profit percentage, return on stockholders' equity

FIRST PRESIDENTIAL INVESTORS

Following a chance meeting in Washington, Connecticut in November 2018, three retired business professionals formed an investment group, named (very appropriately) First Presidential Investors. Logan Roberts had moved to the area in 2017, leaving behind a 30-year career at a prominent department store headquartered in New York City. Caitlin Andrews, a retired retail analyst, resided in nearby New Milford following her move from Boston in 2015. The third group member, Isabella Gardner, was a native Nutmegger who had held an executive position in the insurance industry in Hartford before retiring in 2013.

Being comfortably well-off, the three retirees, without hesitation, contributed $40,000 each to fund First Presidential Investors. Their plan was to begin investing the group's funds in the stock market on the first trading day in 2019.

CREATION OF STOCK PORTFOLIO

Not wanting to put all their eggs in one basket and yet wishing to keep the stock portfolio manageable, the group opted to use their pooled $120,000 to invest $15,000 in each of a diversified group of eight firms. Consensus was reached quickly on the seven firms shown in Table 1:

Table 1: Consensus Firms in Stock Portfolio

#	Company		#	Company
1	Best Buy		5	Merck
2	Boston Beer		6	Nike
3	Ford Motor		7	Target
4	Intel			

As the group searched for an eighth firm, Isabella advocated for the inclusion of a third retailer, given the importance of that sector in the U.S. economy. Logan offered to help in choosing a firm. Having spent decades with a leading department store, he had become aware (perhaps painfully!) of how the growth of three leading off-price apparel retailers – Burlington Stores, Ross Stores, and TJX -- had taken business away from full-service department stores. To document his point, he gathered the data shown in Table 2.

Table 2: Changes in Sales Revenue from 2014-2017 – Department Stores vs. Off-Price Retailers

Company	2017 Sales Revenue ($mil.)	2014 Sales Revenue ($mil.)	Percentage Growth (Decline)
Dillard's	$6,261	$6,621	(5%)
Macy's	$24,837	$28,105	(12%)
Nordstrom	$15,137	$13,110	15%
Burlington	$6,085	$4,815	26%
Ross Stores	$14,135	$11,042	28%
TJX	$35,865	$29,078	23%

The sales-growth comparisons highlighted by Logan in Table 2 were so compelling that each member endorsed adding shares in one of the off-price retailers to their investment portfolio. But which of the three firms? All three had proven able to capitalize on the growing popularity of off-price shopping. It seemed only natural for the group to hear Caitlin's thoughts on the matter, given her retail-analyst background.

Caitlin began by calculating the gross-profit percentage for each firm, dividing its gross profit (excess of sales revenue over cost of goods sold) by its sales revenue. After doing so, she told Logan and Isabella that "there's no reason to go any further – Burlington should be our eighth stock because its gross-profit percentage *far surpasses* that of Ross and TJX, and a high gross profit should increase the chances of a high net income." Caitlin's reasoning made sense to Logan and Isabella, but they pressed her for data that documented Burlington's gross-profit superiority. In response, Caitlin provided the analysis shown in Table 3.

Table 3 : Gross Profit Percentages, 2014-2017

Retailer	2017	2016	2015	2014
Burlington Stores				
Gross profit percentage	41.5%	40.8%	40.0%	39.8%
Ross Stores				
Gross profit percentage	28.9%	28.7%	28.2%	28.1%
TJX				
Gross profit percentage	28.9%	29.0%	28.8%	28.5%

After examining Table 3, Logan commented: "With all due respect, Caitlin, I find it hard to believe that Burlington was able to eclipse the gross-profit percentages recorded by its two major competitors *at any time*, let alone *year-after-year*. Gross-profit percentages can vary greatly by line of business, but here we not only have three apparel retailers, but firms that are successfully operating in the same niche of that market." "It does seem surprising," replied Caitlin, "but the sales and cost of goods sold figures I used for my gross-profit calculations came directly from the firms' audited financial statements."

At this point, Isabella joined the discussion. An avid reader of *Fortune Magazine*, she always awaited the annual *F500* issue, being eager to examine the section on "Most Profitable Companies" -- where firms with the twenty highest profits, returns on sales, and returns on stockholders' equity were highlighted. Isabella recalled that Burlington had been included on one of those lists in the most recent *F500* issue. Following a quick perusal of the June 2018 issue, she informed Logan and Caitlin that "among all *F500* firms in 2017, Burlington's return on stockholders' equity, calculated by dividing its net income by its stockholders' equity, was the fifth highest -- an almost unbelievable *443%."*

Upon hearing of Burlington's 443% return on stockholders' equity (ROE), Logan took issue with Isabella's characterization of it as "*almost* unbelievable." "If you ask me" he said, "it's *totally* unbelievable!" Isabella countered by noting that "the 443% return was calculated by the staff at *Fortune*, one of the most prestigious financial publications in the U.S." "Just out of curiosity," Caitlin asked, "how did Burlington's competitors fare in terms of their ROEs for 2017?" "I thought I might be asked that," Isabella replied. "Ross and TJX ranked 38th and 29th highest among the *F500*, with ROEs of 45% and 51%, respectively; very impressive numbers, but nowhere near the ROE recorded by Burlington for that year," she stated.

In light of Burlington's apparent ability to eclipse the gross-margin percentages of its main competitors and its place on the honor roll of *F500* firms with the highest ROE, First Presidential Investors decided to include the firm in its stock portfolio.

PRICE APPRECIATION OF OFF-PRICE RETAILERS' STOCKS

Because each member's $40,000 investment represented only a tiny fraction of his or her personal wealth, the group felt no need to regularly monitor the market performance of their stock portfolio. Instead, they waited for the one-year anniversary of their investments to check on the portfolio's performance. And it was Burlington's performance that especially interested them. There had seemed to be two very good reasons to favor Burlington over Ross and TJX. Nevertheless, the group had been left with a nagging feeling that they might have missed something when accepting the almost-hard-to-believe ratio results that had so greatly influenced their choice of Burlington.

To what extent, if any, did Burlington's high gross-profit percentage and its huge ROE translate into superior stock performance relative to Ross and TJX? In Table 4, the firms' stock-price appreciation during 2019 is shown. Changes in the S&P 500 Retail Select Index and the S&P 500 Apparel Retail Index are referenced for comparison purposes.

Table 4: Sock Price Appreciation During 2019

Company	Per Share Price on 1/2/2020	Per Share Price on 1/2/2019	% Gain
Burlington Stores	$229.18	$160.16	43%
Ross Stores	$112.38	$80.01	40%
TJX	$58.39	$41.75	40%
	Index on 1/2/2020	Index on 1/2/2019	% Gain
S&P 500 Retail Select Index	4,777	4,261	12%
S&P 500 Apparel Retail Index	2,702	2,125	27%

Based on the data shown in Table 4, First Presidential Investors was pleased to see that Burlington's stock appreciation far exceeded the price increases experience by the overall retail sector and, more importantly, the apparel retail sector. But, of course, the same superior performance was achieved by Ross and TJX. This left the group wondering why the earnings superiority *they inferred* from Burlington's much higher gross-profit percentage and its colossal ROE had yielded such a small market-price advantage over Ross and TJX. Could it be that Burlington's earning power was *not* superior to that of Ross and TJX, despite the ratio results calculated by Caitlin and *Fortune* from the firms' audited financial statements? Caitlin agreed to give additional thought to the gross-profit differences and Isabella volunteered to determine whether something other than earnings superiority could have produced Burlington's 443% ROE.

GROSS PROFIT VS. OPERATING INCOME

"Catlin," Isabella asked, "were we wrong to focus on gross profit rather than operating income, because, in doing so, we failed to consider the firms' operating expenses?" Caitlin responded that "she felt justified assuming that the off-price retailer with the much higher gross-profit percentage was almost certain to report the highest operating income as a percentage of sales." "For this *not* to be true," she continued, "Ross and TJX would have had to have had very low operating expenses to offset their very low gross profits." To test for such a relationship, however unlikely it

seemed to her, Caitlin proceeded to gather (from 10-Ks) the data shown in Table 5. All data shown there represent percentages of sales revenue.

Table 5: Gross Profit vs. Operating Income, 2014-2017

Retailer	2017	2016	2015	2014
Burlington Stores				
Gross profit percentage	41.5%	40.8%	40.0%	39.8%
- Operating expense percentage	33.9%	34.3%	34.7%	35.1%
= Operating income percentage	7.6%	6.5%	5.3%	4.7%
Ross Stores				
Gross profit percentage	28.9%	28.7%	28.2%	28.1%
- Operating expense percentage	14.5%	14.7%	14.6%	14.6%
= Operating income percentage	14.4%	14.0%	13.6%	13.5%
TJX				
Gross profit percentage	28.9%	29.0%	28.8%	28.5%
- Operating expense percentage	17.8%	17.4%	16.8%	16.1%
= Operating income percentage	11.1%	11.6%	12.0%	12.4%

Much to the group's surprise, Burlington's apparent gross-profit advantage was negated after its apparent operating-expenses disadvantage was factored in. "What could be going on here?" Isabella asked. Fortunately, Logan had recently examined the 10-K of Target Corporation, another of the group's holdings. Therein he had discovered, somewhat by accident, how it was possible, even likely, for firms that report far lower gross-profit percentages than their peers to also report far lower operating-expense percentages. "It has to do with where a firm chooses to deduct such supply-chain costs as buying, distribution, and occupancy on their income statements," he noted. To illustrate his point, he presented (in Table 6) excerpts from Target's 2017 10-K.

Table 6: Items Classified in Each Expense Category by Target (Note 3 in Firm's 2017 10-K)

Cost of Goods Sales	Selling, General, and Administrative Expenses
Total cost of products sold	Store and headquarters occupancy costs
Distribution center occupancy and compensation costs	Store and headquarters compensation costs
Moving merchandise from vendors to distribution centers	Advertising and legal costs
Moving merchandise from distribution centers to stores	Other administrative costs

"As we can see," Logan noted, "occupancy and compensation costs related to Target's distribution centers were included within its cost of sales, while occupancy and compensation costs related to its stores and headquarters were reported as operating expenses. When contrasted with a firm that includes *all* occupancy and compensation costs in its operating-expense total, the results are much lower gross profits, due to higher reported cost of sales, *and* much lower reported operating expenses, due to the exclusion of all distribution-center costs." "To Target's credit," Logan continued, "the firm did include a caution that 'the classification of these expenses varies across the retail industry,' albeit in very small print, at the bottom of its classification table" "Did Target then provide data that could allow one to compare its gross- profit percentage with those of peers that choose instead to include those supply-chain costs within their operating expenses?" Caitlin asked. "I'm afraid not," Logan replied.

"Perhaps," Isabella stated, "flexibility in the placement of supply-chain costs is allowed because a firm's bottom-line net income is unaffected." "Maybe," Caitlin responded, "but analysts wish to know the 'spread' between what goods are sold for and what they cost, and when the gross-profit percentage is also influenced by supply-chain costs, that 'spread' can be difficult, if not impossible, to discover."

"Caitlin," Isabella asked, "did Ross and TJX include a table similar to Target's in their 10-Ks, explaining how they classified their operating expenses?" "I have to admit I didn't look for one" Caitlin responded, "because I just assumed that *all* supply-chain costs would be included within the operating-expense amounts." However, in response to the issue raised, Caitlin gave the 2017 10-Ks of the off-price retailers a second look and found that neither Ross nor TJX included a classification table similar to Target's. However, she did discover (as shown in Table 7) that both firms described the components of their cost of goods sold in the Summary of Accounting Policies contained in the first note to their financial statements.

Table 7: Cost of Goods Sold Disclosures in Firms' 2017 10-Ks

	Title on Income Statement	Classification Discussion Contained in Firm's 10-K
Burlington	Cost of sales	Not necessary -- no operating expenses in cost of sales
Ross	Cost of goods sold	Includes buying, distribution, and occupancy costs
TJX	Cost of sales + buying and occupancy	Includes buying and distribution-center occupancy costs

"As we can see," Caitlin observed, "Ross and TJX did inform 10-K readers that their cost of goods sold numbers included what some other firms, such as Burlington, continue to classify as operating expenses. However, neither included the caution that Target had inserted acknowledging the variability in classification that exists among retailers." "Interestingly", she continued, "while the title used by TJX on its income statement should have alerted me to the firm's policy, Ross' income statement provided no such indication. So, I've learned that even when the income-statement description is just 'cost of goods sold', one needs to search out the classification disclosures to learn whether that number might include supply-chain costs."

Reflecting on the data presented in Tables 5, 6, and 7, First Presidential Investors now had a very plausible explanation for why Burlington's apparently huge advantage in gross profits did not translate into much better stock-price performance than that experienced by Ross and TJX. Burlington's gross-profit percentage appeared to be higher only because, unlike Ross and TJX, it excluded (not incorrectly!) *all* operating expenses from its cost of goods sold number, not just those for its stores and headquarters.

One mystery remained, however. Absent superior earnings, how did Burlington's return on stockholders' equity come to far exceed that of Ross and TJX and rank fifth highest among all *F500 firms*? The group had reasoned that the only way for Burlington to have had such a high ROE in 2017 was for it to have had extremely high earnings that year, because as Logan noted, "net income is the numerator of every returns ratio, be it return on assets (ROA), return on sales (ROS), or ROE." He wondered how Burlington's ROE could be so high without a superior earnings figure for the numerator. Isabella offered to give this matter some additional thought.

BURLINGTON'S RETURN ON STOCKHOLDERS' EQUITY

Isabella began by checking whether the data contained in Burlington's 2017 10-K did, in fact, compute to the 443% ROE calculated by *Fortune*. Assured that it did, she then wondered whether Logan was justified in viewing ROE in the same light as other return measures. She asked him and Caitlin to consider whether there could be items that so diminish a firm's stockholders' equity that, while not possible for ROA and ROS, an impressive return could result solely from a very low denominator, without the numerator having to be exceptionally high. "As an extreme example," Isabella continued, "a firm with just $1 of stockholders' equity would only need $3 of net income to report a 300% ROE." "Isabella," Caitlin asked, "just what items could cause a firm's stockholders' equity balance to become very low?" To answer Caitlin's question, Isabella accessed the firms' 2017 10-Ks and gathered the data shown below.

Table 8: Components of Firms' Stockholders' Equity Balances at Year-End 2017 (dollar amounts in millions)

Company	Paid-In Capital	Retained Earnings	Treasury Stock	Other	Stk. Equity and *F500 rank*
Burlington	$1,457	($675)	($693)	($2)	$87 -- 31st lowest
Ross	$1,296	$2,071	($318)	-0-	$3,049 – 338th highest
TJX	$628	$4,962	-0-	(442)	$5,148 – 262nd highest

As illustrated in Table 8, two items of almost $700 million each lowered Burlington's stockholders' equity balance. As a result, despite having over $1.4 billion of paid-in capital, the firm ended up with a numerator for its ROE of only $87 million, the thirty-first lowest stockholders' equity balance among the *F500.* Burlington's paid-in capital (amounts received from the issuance of stock) did comfortably exceed those of Ross and TJX. However, its holdings of shares it bought back (treasury stock) were more than twice that of Ross', and TJX held none of its own shares at the end of 2017. Furthermore, in terms of retained earnings, Burlington's $675 million *negative* balance stood in stark contrast to the *positive* balances of $2.0 billion and $4.9 billion reported by Ross and TJX, respectively.

"I know negative retained earnings often results when a firm has had many years of sizable net losses, but why do we see this for Burlington, a consistently profitable firm?" Logan asked. "I wasn't sure why," Isabella responded, "until I did some research on how stock buybacks are accounted for. It turns out that the cost of buybacks goes into the negative-equity account, Treasury Stock, if the shares are *still being held* by the firm. But when treasury shares have been *retired,* losses that arise from having bought back shares at more than their original issue price go to reduce retained earnings." "So, if I understand this correctly," Caitlin asked, "Burlington must have retired at a loss many shares it had bought back, although some treasury shares were still being held by the firm." "That's correct," Isabella replied.

TAKEAWAYS

Looking back on their choice of Burlington Stores as the off-price retailer to add to their stock portfolio, First Presidential Investors reviewed the factors that had falsely suggested superior earning power on behalf of that firm. What had they learned to make them better analysts of financial data in the future? Among the takeaways cited by the group were the following:

1. Firms are given much discretion as to where they place their buying, distribution, and occupancy costs on the income statement. Such discretion can make it *falsely appear* that peer firms with similar products and pricing strategies differ greatly in terms of their success at generating gross profit and controlling operating expenses. As a result, analysts' evaluations of the relative success of peer firms can be made much more challenging, especially when their focus is on retailers with sizable supply-chain costs.

2. When all supply-chain costs are included within a firm's operating expenses, gross profit and operating expenses as percentages of sales revenue can both appear much higher than the percentages reported by peer firms that have included supply-chain costs within their cost of goods sold. The impressive gross profit that results can incorrectly signal superior earning power, for it is unlikely to carry through to operating income.

3. Even when a firm's income-statement labels the deduction from sales revenue as "cost of goods sold," one needs to examine the firm's Summary of Accounting Policies because it might reveal that this deduction includes supply-chain costs that peers have chosen, instead, to include within their operating expenses.

4. A firm's return on stockholders' equity needs to be interpreted very carefully. Under certain circumstances, this important ratio might not inform on the firm's earning power. A high ROE could be due to a very low stockholders' equity balance rather than a very high net income amount. This situation is more likely to occur when a firm has a very large negative balance of retained earnings and/or very large holdings of treasury stock.

5. Even when a well-respected business publication correctly calculates a ratio using data from audited financial statements, the results could inadvertently mislead its readers.

TEACHING NOTE

Student Audiences

Students assigned this case should be familiar with the calculation of the three financial measures defined and featured therein (gross-profit-percentage, operating income, and return on stockholders' equity) and the major components of stockholders' equity (paid-in capital, retained earnings, and treasury stock). In addition, they should be comfortable searching online for financial statements contained in firms' 10-Ks. This case can be used in Intermediate Accounting classes as well as Financial Statement Analysis and Corporate Financial Reporting classes at the undergraduate and graduate levels. In addition, it can serve as a capstone assignment near the end of an Introductory Accounting course or as part of an accounting review in a Corporate Finance course.

Time Commitment

As a homework exercise, most students should complete the case in one hour, with perhaps twenty-five minutes to read/study the case and thirty-five minutes to address the six discussion questions. A follow-up class conversation could take fifty minutes, especially if students are prompted to debate/defend their answers to the more open-ended questions.

Questions for Assignment (*suggestions for class discussion follow each question and are in italics*)

1. Presented below are calculations for gross profit, operating expenses, and operating income, all as percentages of sales revenue, derived from financial data reported in the 10-Ks of four groups of peer firms. In each group, one retailer, like Burlington, includes supply-chain costs among its operating expenses (OE) while the remaining firms, as was true for Ross and TJX, include supply-chain costs within their cost of goods sold (CGS).

    1. Discount Department Stores: Kohl's, Target, and Wal-Mart
    2. Family Clothing Stores: Abercrombie & Fitch, American Eagle Outfitters, and Urban Outfitters
    3. Shoe Stores: Genesco, Foot Locker, and Shoe Carnival
    4. Beauty Stores: Sally Beauty and ULTA Beauty

Retailer	Kohl's	Target	Wal Mart	Abercrombie	AEO	Urban Out.
10-K filed on	3/21/24	3/13/24	3/15/24	4/1/24	3/15/24	4//1/24
Supply-chain costs in	OE	CGS	CGS	OE	CGS	CGS
Gross profit percentage	36.7%	26.5%	23.5%	62.9%	38.5%	33.5%
Operating expense percentage	37.7%	22.7%	21.0%	51.7%	31.6%	26.0%
Operating income percentage	(1.0%)	3.8%	2.5%	11.2%	6.9%	7.5%
Retailer	Genesco	Foot Locker	Shoe Carn.	Sally Beauty	ULTA	
10-K filed on	3/27/24	3/28/24	3/22/24	11/16/23	3/26/24	
Supply-chain costs in	OE	CGS	CGS	OE	CGS	
Gross profit percentage	47.3%	27.8%	35.8%	50.9%	39.1%	
Operating expense percentage	46.5%	25.1%	27.9%	41.7%	24.0%	
Operating income percentage	0.8%	2.7%	7.9%	9.2%	15.1%	

A friend who examined the above data for Genesco and Foot Locker remarked that "maybe it's a good time for the two shoe retailers to merge. With Genesco's ability to maximize gross profit and Foot Locker's control over its operating expenses, the combined firm could have an operating-income percentage of 22.2% (47.3% - 25.1%)." Indicate how you would respond to your friend's suggestion.

Although the above data seem to suggest expertise on the part of Genesco in maximizing its gross profit and expertise on the part of Foot Locker in controlling its operating expenses, that is not the case. The sizable differences noticed by the friend are the result of Genesco including all supply-chain costs within its

operating expenses while Foot Locker included them in cost of goods sold. As seen above, after each firm's supply-chain costs were deducted somewhere, operating-income percentages were 0.8% and 2.7% for Genesco and Foot Locker, respectively, nowhere near the 22.2% envisioned by the friend.

2. A neighbor glanced at the data shown for peer firms in Question 1 and commented as follows: "Why should anyone care where supply-chain costs are deducted on the income statement, as long as they're deducted somewhere? The firm's operating income as a percentage of sales will be unaffected, so analysts can use that number with the utmost confidence." Indicate how you would respond to your neighbor's comment.

   It's true that operating income as a percentage of sales is not affected by where supply-chain costs are placed on the income statement. However, because the "spread" between what goods are sold for and what they cost can be of great interest, analysts are denied that knowledge when the cost-of-goods-sold number includes supply chain costs.

3. As shown in Question 1, gross-profit percentages varied by 29.4% among the three family clothing stores -- due to their disparate treatment of supply-chain costs -- but their operating-income percentages varied by only 4.3%. Less dramatic, but still substantial, variation differences were present within the three other retailer peer groups. The following actions, if taken by the accounting profession, could address the misunderstandings that can result when analysts attempt to compare gross-profit percentages of peer firms.

   a. Continue to allow discretion for firms, *but only if* they include a caution that "the classification of these expenses varies across the retail industry" – and in regular-sized print, unlike Target's caution.

   b. Continue to allow discretion for firms, *but only if* they disclose the amount, if any, of supply-chain costs included within their cost of goods sold, to allow for comparisons with peer firms that classify such costs as operating expenses.

   c. Require firms to include all supply-chain costs within their operating-expense totals.

   d. Require firms to include all supply-chain costs within their cost of goods sold.

   Which *one* of the above approaches would you recommend that the accounting profession adopt to address the misunderstandings that currently can result? Explain.

   There is no right or wrong answer here. Many students who believe that firms should continue to be allowed discretion will favor approach (b) over approach (a). Their reasoning is that "while it's good to be warned that the data you're about to compare for peers might not be comparable, it's much better to have the information needed to place the peers on a level-playing field." Among students who believe that the treatment of supply-chain costs should be uniform across all firms, a larger number often select approach (c) over approach (d). Reasons given include a view that "supply-chain costs feel more like operating expenses than product costs" and a belief that "gross-profit best communicates when it captures only the 'spread' between what goods are sold for and what they cost."

4. Earnings were not an annual event at Rite Aid, the drug store chain. In fact, during the five-year period ending in fiscal 2012, the firm's income statements reported aggregate net losses in excess of $5 *billion*. Therefore, it must have come as a surprise to analysts and the company's management when *Fortune just four years later* (June 2016 issue) touted the firm as having the *highest* ROE among all *F500* firms. In fact, Rite Aid's ROE of 3,697% *exceeded the combined ROEs* shown for the nineteen other firms on *Fortune's* Top-20 ROE List for 2015.

   a. In light of its 3,697% ROE, would it surprise you if Rite Aid had one of the lowest stockholders'-equity amounts among the *F500* in 2015?

This would not be a surprise. For a firm with a history of very low, if any, net income, an extremely high ROE will result from a very low denominator on that ratio rather than a very high numerator. Among the F500, Rite Aid's stockholders' equity was the 25th lowest.

b. Assume you are aware that Rite Aid had never bought back any of its shares. In light of this information, what would be most responsible for the firm's extremely low stockholders' equity?

Rite Aid's balance sheet reveals that over 98% of its $5.5 billion of paid-in capital was "absorbed" by its $5.4 billion of negative retained earnings. This is not surprising given the firm's history of extremely large net losses. And we can be certain it was the firm's operations rather than losses on treasury-stock retirements that created the negative retained earnings because the firm had never bought back any of its shares.

c. If you had been a member of Rite Aid's management in 2016, would you have been pleased to have your firm's "off-the-charts" return on stockholders' equity highlighted by *Fortune*? Explain.

It's most unlikely that this recognition by Fortune resulted in champagne corks popping in the executive suite. After all, with an ROE of 3,697% in 2015, what do you do in 2016 for an encore? And, as noted (in a and b) above, Rite Aid's ROE appeared to be so high only because the firm's substantial past net losses caused its stockholders' equity to almost disappear. The irony is that it was the firm's lack of net income in many prior years that made it look so successful on the ROE measure in 2015.

5. In November 2021, a relative attending the family Thanksgiving indicated she was considering an investment in one of two auto-parts retailer. To aid in her selection, she focused on the three measures that *Fortune* highlighted in the "Most Profitable Companies" section of its annual *F500* issue. The data she gathered from the magazine's June-July 2021 issue were as follows:

Year	Company	Profits (in $ mil.) and *F500* Rank	Return on Sales and *F500 Rank*	Return on Stockholders' Equity and *F500* Rank
2020	O'Reilly Auto	$1,752 - 137th Highest	15.1% - 95th Highest	1,249% - 2nd Highest
2020	AutoZone	$1,733 - 139th Highest	13.7% - 108th Highest	Cannot Be Calculated – No Rank

After observing how similarly the two retailers performed in terms of profits and return on sales, she wondered what item was most responsible for one firm winding up with the second highest ROE among all *F500* firms while the other firm's ROE went unranked. Examine the 2020 10-Ks for O'Reilly Auto and AutoZone (filed in February 2021 and October 2020, respectively) and identify that major item. Express dollar amounts in millions when filling in the blanks below.

Firm	Paid-in Capital	?	Treasury Stock	Other	Stockholders' Equity
O'Reilly Auto	$1,281		-0-	($2)	
AutoZone	$1,283		($356)	($354)	

As shown below, negative retained earnings of $1.1 and $1.4 billion drastically lowered both firms' stockholders' equity. The negative retained earnings for these profitable firms most likely resulted from large losses incurred on treasury stock retirements; this is confirmed when their Statements of Changes in Stockholders' Equity are examined. Despite the sharp declines in stockholders' equity resulting from the negative retained earnings, O'Reilly's ending balance remained positive, allowing for calculation of an enormous ROE. No ROE calculation was possible for AutoZone because its stockholders' equity had become negative.

Firm	*Paid-in Capital*	*Retained Earnings*	*Treasury Stock*	*Other*	*Stockholders' Equity*
O'Reilly Auto	*$1,281*	*($1,139)*	*-0-*	*($2)*	*$140*

AutoZone	*$1,283*	*($1,451)*	*($356)*	*($354)*	*($878)*

6. If Logan, Caitlin, and Isabella were to send a copy of this case to *Fortune*, pointing out how its readers could be inadvertently misled when examining its listing of those *F500* firms with the highest ROEs, *Fortune's* management might choose to react in one of the following ways:

   a. Make no changes, since the ROE calculations are based on data from firms' audited financial statements.

   b. Continue to report the top ROE rankings, but exclude firms whose high rankings on this ratio are due more to a low denominator than a high numerator.

   c. Continue to report the top ROE rankings, but remove them from the "Most Profitable Companies" section.

   d. No longer highlight the *F500* firms with the twenty highest returns on stockholders' equity.

   If *you* were the executive in charge of the magazine's *F500 issue*, which of the above approaches would you opt for after reading this case and studying the points raised therein? Explain.

   To many students, there's no good choice here. Those who argue that only firms with sizable stockholders' equity balances should have their ROEs highlighted concede that deciding what minimum level of stockholders' equity would be necessary for inclusion could be a difficult and arbitrary exercise. If the ranking continues to be published without regard to firms' levels of stockholders' equity, it will continue to be subject to misinterpretation, perhaps even more so if kept in a section entitled "Most Profitable Companies." On the other hand, if Fortune were to cease labeling the ranking as a profitability measure or stop publishing the ranking altogether, some readers might wonder why this occurred. It's unlikely that Fortune would inform them that it just now realized, after publishing the ROE ranking for many decades, that ROE might under certain circumstances be flawed as a measure of profitability. Therefore, as a practical matter, a good wager could be that Fortune would choose to maintain the status quo.

Martin Gosman, Ph.D., is Visiting Scholar in Economics at Wesleyan University and Professor Emeritus of Accounting at Quinnipiac University.

Mathius Gazi is a member of the Class of 2025 at Wesleyan University.

Akiva Lind is a member of the Class of 2026 at Wesleyan University.

Long-Term Considerations Based on Market Trends and Ongoing Success Factors for a Fully Online Business Bachelor's Degree Completion Program

Kathy Richie, Minnesota State University, Mankato, MN, USA
Claudia Pragman, Minnesota State University, Mankato, MN, USA

ABSTRACT

Higher education continues to explore options to maintain and sustain programs for students working full-time by offering degree completion programs that balance life and work and serve to meet their educational goals. A potential competitive advantage may be the ability of institutions to provide personalized assistance and flexible course offerings. The College of Business at our university began a Bachelor of Business Administration degree completion program in 2018. Three years later, we observed changes in our student demographics and the demand for post-secondary education. We gathered data on the 197 students who had enrolled in the program in those three years and reviewed the marketing, recruiting, and advising strategies we employed during that period. Along the way, we observed that the success of our program earned support from our university, inspired us to make the curriculum more relevant, and allowed us to assemble an academically qualified core faculty. In the future, we will continue to gather and analyze the track and analyze program data, look for trends, and alter our strategies.

Keywords: working adults, online learning, bachelor of business administration, degree completion

INTRODUCTION

We represent a College of Business faculty at a state university, Minnesota State University, Mankato, that is part of MinnState. MinnState is a public higher education system that includes seven state universities and 26 community and technical colleges on 54 campuses (MinnState,n.d.). In the summer of 2017, we met with faculty from Riverland Community College (RCC) in Owatonna, MN, one of the two-year community colleges in our state system. A couple of years earlier, and at the request of a significant Owatonna employer, the business faculty at RCC had developed an entirely online asynchronous Associate in Science (AS) Business Degree trademarked as FlexPace. The program model was to offer three short-term courses sequentially each semester, allowing students to focus on a single class and accelerate their degree completion (Business – FlexPace, n.d.). That program was graduating students who expressed interest in completing a four-year business degree. The RCC faculty wanted our college to replicate their program model and develop a program that would allow their students to complete their bachelor's degree in business.

We accepted Riverland's request and agreed to partner with their faculty. In the fall of 2017, a team of faculty, staff, and administrators from both campuses determined that the best option was to develop a general business degree and settled on a Bachelor of Business Administration (BBA) program. We admitted the first students to our program in the fall 2018 semester. Our college's BBA program is AACSB-accredited, takes approximately two years to complete, and offers three 5-week courses each semester. Before admission to the program, our intent was for students to complete their AS in Business degree (Bachelor of Business Administration Degree, n.d.).

However, in the first three years of the BBA program, we experienced growing pains with faculty and staff changes and lower-than-expected student enrollment. It soon became evident that we would need to reach out to transfer students from other MinnState Community Colleges that offered AS in Business degrees. Enrolling new students was difficult without a dedicated BBA recruiter. For the second year, we did hire a BBA recruiter/advisor and experienced a marginal enrollment increase. Unfortunately, that person left the position after one year. It was several months before we hired our second BBA recruiter/advisor, who began in the fall 2021 semester and continues with us today. Even with a dedicated recruiter, enrollment goals were not being met by limiting admission to students who had completed their AS in Business. Therefore, the recruiter met with students who needed to complete the equivalent of an AS in Business before beginning the BBA program. This change meant our future students had to complete some general education and lower-level business foundation courses before admission to the BBA program (K. Richie, personal communication, 2024).

In the three years since hiring our current recruiter, we have been able to collect student demographic and economic data that revealed our student population had grown more diverse at a time when employers were reducing the need

for a post-secondary degree as a job requirement. Despite these contradictions, our program was experiencing success. Consequently, we wanted to understand what factors might be leading to this success (C. Pragman, personal communication, 2024). Subsequent analysis indicated that our marketing, recruiting, and advising strategies were likely responsible for our program's achievement.

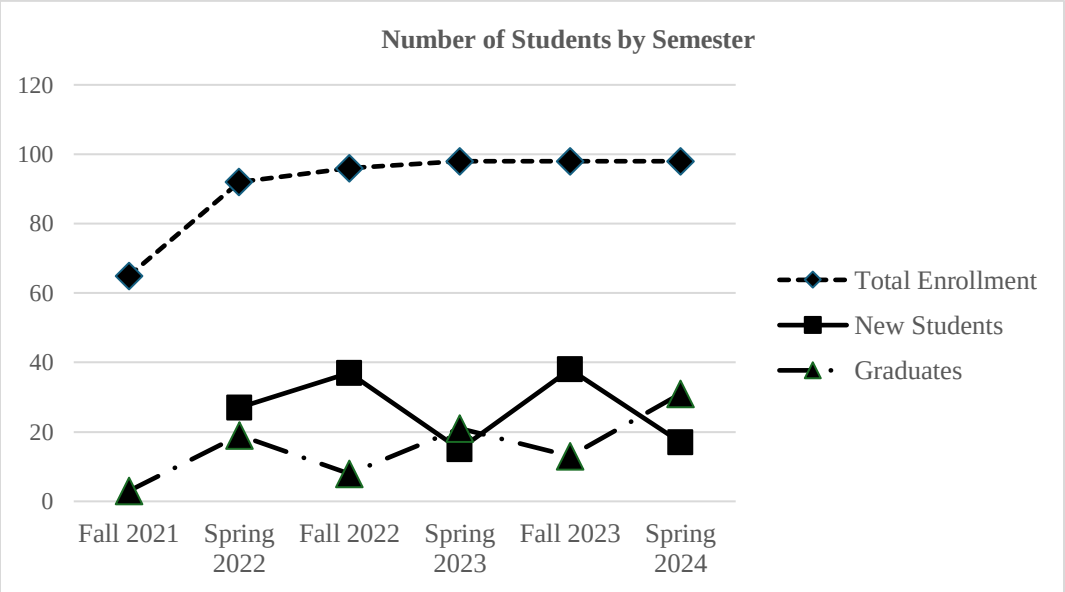
If marketing, recruiting, and advising strategies were the success factors, then how we employed them to our benefit became critical. This article will describe our analysis of the most recent three-year review period and how we plan to keep tracking our market data, identify factors that contribute to program success (or failure), and adapt our marketing, recruitment, and advising efforts to remain competitive. Furthermore, we will share details about how we used those factors to acquire resources from our university, refresh the BBA curriculum, and build a core faculty committed to the success of the program.

UNDERSTANDING STUDENT DEMAND

Enrollment Trends

Since the fall 2021 semester, 197 students have enrolled, graduated, or left the program. Students identified as leaving the program would include those who withdrew or are temporarily pausing their enrollment. Whereas sixty-five students were enrolled in BBA classes in the fall 2021 semester, our program now averages just under one hundred students registering for courses each semester. Program enrollment by semester is illustrated in the figure below. We have a rolling admissions policy, with students being admitted to start the program in the fall and spring terms. The number of students beginning the program in the fall is higher than in the spring because the "recruitment period" for the fall term includes the spring and summer months. Graduation rates are highest in the spring semester. Most semesters, we are able to recruit enough new students to replenish the previous semester's graduates (G. Torzewski, personal communication, February 15, 2024).

Figure 1: Student Enrollment in the Bachelor of Business Administration Program



Student Demographics

In the last three years, the demographics of the average student admitted to the BBA program have changed. Our intended market had been adult learners working full-time. Table 1 summarizes the demographic factors for the last three years.

When the program began, the average student's age was "thirty-something." Now, more BBA students fall into the traditional age category of the mid-20s and younger. Fifty-eight percent of the students are female, and 23% are

students of color. Currently, the BBA program leans toward serving more females and more students of color when compared to our legacy College of Business and University programs. Almost all of our BBA students are Minnesota residents who reside in the Twin Cities (Minneapolis and St. Paul) metro area.

Eighty-six percent of our students are transfer students, mainly from the two-year community colleges within our state higher education system. However, another population we have been tapping into recently is that of our current, traditional-age college or university students changing their major to the BBA program (14%) because they are working full time and need the flexibility of an online business program (G. Torzewski, personal communication, February 15, 2024).

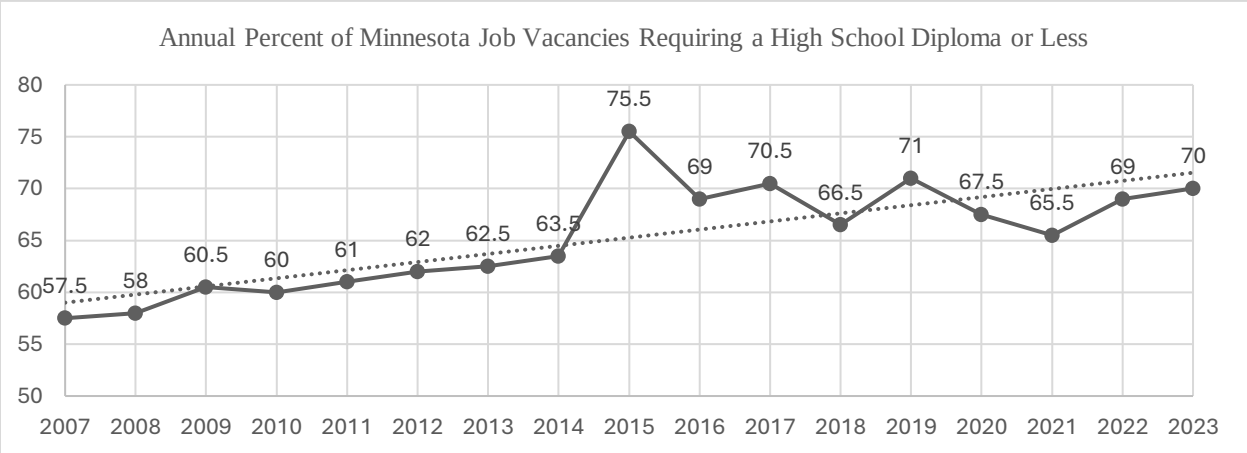
Table 1: Bachelor of Business Administration Student Demographics (n = 197)

Demographic Factor	Number	Percentage
Minnesota Resident	188	95.4%
Non-Minnesota Resident	9	4.6%
Traditional Age	100	50.8%
Non-Traditional Age	97	49.2%
Female	114	57.9%
Male	83	42.1%
Non-Student of Color	152	77.2%
Student of Color	45	22.8%
MinnState Transfer	169	85.8%
Non-MinnState Transfer	28	14.2%
Non-Transfer Within	169	85.8%
Transfer Within	28	14.2%

Employment Trends

The Minnesota economy has grown stronger since the Great Recession of 2007 – 2009. In the past 17 years, the number of job vacancies in Minnesota requiring no more than a high school diploma has trended upward. Figure 2 illustrates this trend. Job vacancies peaked in 2015 and decreased during the pandemic years, but they are once again increasing. On average, the increase in job vacancies for applicants with no post-secondary education is 0.78% annually.

Figure 2:Annual Percent of Minnesota Job Vacancies Requiring a High School Diploma or Less—2007 – 2023



Source: Minnesota Department of Employment and Economic Development (Luke Greiner, personal communication, February 14, 2024)

As the number of job vacancies increases, many state governments no longer require a four-year degree for many of their jobs (Lederman, 2023). Even some national corporations, such as General Motors, Delta Airlines, IBM, and Google, have relaxed the requirement of a post-secondary degree for some jobs (Nietzel, 2023). In October 2023, Minnesota's Governor signed an executive order requiring state agencies to implement a hiring process that emphasized skills and work experience as opposed to degrees in jobs that do not need certifications or licensures by law (Moody, 2023). This policy change is expected to open at least 75% of Minnesota government jobs to applicants without a post-secondary degree, providing them with access to good jobs and enabling the state the chance to retain workers. Specifically, on-the-job training, technical education, and military service will open more state jobs to more Minnesotans (Neitzel, 2023).

LEVERAGING MARKET TRENDS TO ADVANTAGE SUCCESS FACTORS

As job vacancies increase and employers reduce their education requirements, those changes may signal a decrease in the need for post-secondary education. However, the growth of our BBA program and the difference in our students' demographics may tell a different story. And that story may be that even traditional-age students may be interested in advancing their education while working full-time. Furthermore, Luke Greiner, a regional analyst with Minnesota's Department of Employment and Economic Development, cites the financial benefits of earning an associate's or bachelor's degree. Greiner's research finds that students with an associate's degree in business administration earn, on average, $56,000 annually after eight years of employment. For that same period, the average annual salary for an employee with a bachelor's in business administration is $76,000 (L. Greiner, personal communication, 2024). Consequently, the message may be that students value both employment and post-secondary education.

Our original BBA program was designed as a degree completion program for working adults who earned their AS in Business from our initial two-year community college partner. Recent data suggests that our students come from more diverse origins—other community colleges, universities, and majors (C. Pragman, personal communication, 2024). To grow our online program, we need to take advantage of these trends in the ways we market to and recruit potential students. Furthermore, we want to retain the students who enroll in our BBA program through responsive curriculum design and faculty engagement.

Marketing Strategies

The BBA program webpage on the university's website is a primary marketing tool. This site is the source of data for the admissions office's weekly funnel report. In recent months, the BBA webpage has been updated with new imagery and a redesign of its essential elements, which include the main narrative, section updates with text, and links for the various constituencies we attract. The site is reviewed a few times a year, and updates are recommended (M. Bilden, personal communication, 2024).

The constituencies mentioned above reference our MinnState two-year community college partners. Our recruiter/advisor has made connections with business program advisors at those institutions and prepared proprietary marketing materials for each school. These proprietary marketing materials or "transfer pathway" documents map the community college's AS in Business courses to the business foundation courses needed to enroll in the BBA program. In other words, these documents identify which community college classes will transfer to our program's lower-level business foundation and general education classes. In addition to being shared with community college advisors, these transfer pathway documents are posted on our university's BBA website. Currently, we have transfer pathway documents available for 11 of our community college partners, with more to come (M. Bilden, personal communication, 2024).

In addition to the transfer pathways, other marketing strategies are also pursued. The BBA recruiter visits community college campuses. Our university's Director of Partnerships reaches out to deans, faculty, and staff at our partner institutions. There is also outreach to students who have stopped out or are enrolled in a different program at our university and may be interested in changing their major to the BBA program. Furthermore, each semester, there are multiple Online (Zoom) Information Sessions. These types of outreach are the result of information collected from the weekly funnel reports (M. Bilden, personal communication, 2024).

Thus far, the marketing strategies discussed have been funded through university personnel, functions, and offices. However, investments have been made through paid marketing channels. Digital marketing was done in partnership with our city's local newspaper. Secondly, in the fall of 2023, digital marketing was conducted through one of our

university's approved vendors that issued a general "Complete your degree online, and here are your options message." Lastly, we invested in Geo-fencing digital marketing in late 2022 and spring 2023. This strategy meant a digital ad for the BBA program would appear on a person's phone or device when they were within a measured radius around a specific community college. Geo-fencing was successful and will be implemented again with the community colleges in the spring of 2024 (M. Bilden, personal communication, 2024).

Recruitment Strategies

Each week, our recruiter/advisor receives a Weekly Admissions Funnel report from our university's admissions office that provides data from multiple funnels (inquiries, applicants, and admits). These reports provide the necessary input to send interested students information on how to apply to the program, admission decisions, upcoming events, and next steps in the admission process (G. Torzwerski, personal communication, 2024).

Not all students who express interest in the BBA program have an AS in Business from one of our MinnState System community colleges. Many have A.A. degrees or some or no college credits. Our recruiter does his best to "meet them where they are" and provide them with an academic plan that allows them to complete their BBA degree. Sometimes, that academic plan involves taking non-BBA classes during the regular semester or the summer term at our university or other MinnState community colleges. For students who do not have any college credits, he will often advise them to enroll in the online AS in Business program with our original community college partner because that program has a similar schedule of short-term online classes offered one at a time, allowing students to finish an associate's degree in approximately two years. It may seem odd that our BBA recruiter recruits students for a two-year school. Still, that strategy is often best for the student because tuition at community colleges is less expensive than at a four-year institution. This recommendation will enable students to complete their lower-level requirements affordably (G. Torzwerski, personal communication, 2024).

Another strategy that has proven successful is a corporate partnership. A healthcare provider headquartered in the state of Minnesota selected our BBA program as its educational partner. This organization established a Career Immersion program for talented employees who want to further their education, remain employed, and advance in their careers. The employer screens students for this program, and then, depending on their previous level of education, the employees begin their academic journey with us or our original community college partner. Three students are currently enrolled in the Career Immersion program, and seven more will start in fall 2024 (G. Torzwerski, personal communication, 2024).

This partnership has contributed to an uptick in students who receive tuition reimbursement from their employers. When we first envisioned the BBA, we thought employers would provide tuition reimbursement for their employees. Unfortunately, reimbursement has not been a standard employee benefit. The majority of our BBA students utilize financial aid, which means getting an education increases their debt. Corporate partnerships are a win-win for us and the corporate partner. The partner selects talented employees, supports them, and pays their tuition, and our program grows enrollment. Seeking more corporate partnerships is a means of increasing program enrollment (G. Torzewski, personal communication, 2024).

Advising Strategies

Thus far, this article has focused on the marketing and recruiting activities performed by our dual-role BBA recruiter/advisor. While it is essential to enroll students initially, it is also vital to retain them. The advising function is designed to help students cross the finish line to complete their bachelor's degrees. Essentially, BBA students receive one-on-one, personalized advising. The advisor checks in with the student throughout the semester to learn if classes are going well or not. When it is time to plan for the next term's classes, students want to know what classes they need to take and when they must register. Often, individual email messages to each student are enough of a prompt to complete the process.

On the other hand, some advisees prefer a Zoom advising session. The choice of Zoom or email advising depends on what form of communication works best for the student. Furthermore, some students need more reminders or meetings than other advisees to complete the registration process. Reminding entails a cycle of checking each BBA student's registration record to verify enrollment and sending reminders until the student registers. Consequently, advising activities can take a significant amount of the BBA recruiter/advisor's time, notably when students do not follow through on the registration process. Nevertheless, vigilant advising has likely reduced melt, the term used to describe

students who leave the program for a variety of reasons. Overall, a high percentage of our BBA students complete the program in approximately two years (G. Torzwerski, personal communication, 2024).

University Support for Online Programs

The BBA degree program is offered through our College of Business, but it is one of several online-only programs provided by our university. These online programs are a separate unit of the Academic Affairs division. Being part of this unit offers access to proprietary resources and entails operating under a different funding model. The unit has an online programs director who supervises accounting, budgeting, financial modeling, and marketing personnel. The staff specialists serve all of the university's online programs. In the previous "marketing strategies" section, we described the services provided by the marketing staff. Below the online programs director is a director for each of the online programs, which in our case is the BBA director. The BBA director works with faculty to staff the classes. The previously described BBA recruiter/advisor reports to the BBA director (J. Paver, personal communication, 2024).

Non-online degree programs operate under the university's "general fund." The funding model for the online programs is market-based in that tuition revenue must cover all program expenses. A portion of any "profit" is returned to the program for reinvestment. Program expenses include faculty salaries, the compensation of the BBA recruiter/advisors, and chargebacks for staff services. The accounting and budgeting staff track the tuition income and program expenses. Each semester, the online programs director and his staff meet with the individual program directors, one of whom is the BBA director, to review the financials for that semester and the academic year. The financial modeling staff creates predictive models to project the impact of changes in student enrollment and adding faculty. In fact, in the next academic year, the BBA program will benefit from predictive modeling by being able to add another faculty member to its staff. This new faculty member will enrich the student experience and provide additional support and expertise to the program (K. Burger, personal communication, 2024).

Refreshing the Curriculum

When we began the BBA program in the fall of 2018, we designed the curriculum based solely on what the AS in Business students who transferred from our original partner community college needed to complete their business bachelor's degree. Once we began accepting transfer students from other schools and other programs, and with fewer credits, we realized they needed a different set of courses. The revised "meet them where they are" admissions policy required customized academic plans for students. For example, a student who transfers with an A.A. degree likely has completed the needed general education courses for an associate's degree but lacks the business foundation courses in accounting, business law, economics, information technology, and statistics. Our BBA recruiter/advisor had to tailor an academic plan for each admitted student (G. Torzwerski, personal communication, 2024).

Having a more diverse student body also meant we had to find ways for students to meet their lower-level requirements before beginning their BBA courses. The options were to take general education or business foundation courses as 15-week classes during the regular semester or as 5-week classes during summer sessions. Unfortunately, during a regular semester at our university, it can be challenging to find an online asynchronous general education or lower-level business class. For this reason, the BBA recruiter/advisor would often recommend enrolling in the class at our original community college partner because its AS in Business program offers them as short-term courses (G. Torzwerski, personal communication, 2024).

Changes to the original BBA course curriculum were also necessary to update the curriculum and make it more relevant. Some theory content courses were replaced with different classes, and professional development courses were added. The professional development courses were designed to prepare students for managerial roles. The current core curriculum has stabilized at ten courses and 37 credits. In addition to those required courses, there is a three-credit 300- or 400-level elective course needed to meet the 40-credit-hour upper-division graduation requirement. The following table summarizes the current core curriculum. Each semester, we try to mix theory and professional development courses to balance theory and practice (K. Richie, personal communication, 2024).

Table 2: Bachelor of Business Administration Program Core Curriculum

Fall Semester Year 1	**Spring Semester Year 1**
Intro to Business Professionalism	Integrated Marketing Communications
Human Resource Management	Operations Management for the Supply Chain
Introduction to MIS	Principles of International Business
Creativity & Innovation	
Fall Semester Year 2	**Spring Semester Year 2**
Business Professionals	BBA Capstone
Business Finance	Project Management
Leadership	Business Policy & Strategy

All courses above are three credits, with the exception of the Intro to Business Professionalism course, which is one credit. Additional undergraduate graduation or residency requirements necessitate that students earn a minimum of 120 credits for a bachelor's degree. Students work directly with the BBA recruiter/advisor to develop an academic plan that meets the general education, core, and elective course requirements for their degree (K. Richie, personal communication, 2024).

Expanded Faculty Support for the Curriculum

Because our BBA program is AACSB accredited, we must limit the use of adjunct faculty to meet accreditation standards requiring faculty to be qualified to teach in their discipline. In the past three years, we have found a group of faculty dedicated to teaching BBA classes in their discipline. Most faculty will teach their BBA class only once a year, while others may teach a class every semester. We are at a point where both the curriculum and the faculty are stabilized. This stabilization enables students to experience the expertise of a variety of faculty throughout the program (M. Fox, personal communication, 2021).

Furthermore, faculty stay connected and receive program updates through monthly staff meetings with the BBA recruiter/advisor and the program director. In addition to the monthly meetings, there is an annual meeting where the faculty gets together to reflect on the past year and discuss potential program changes. These types of discussions are what led to the curriculum redesign, as discussed in the previous section.

CONCLUSION

The purpose of our Bachelor of Business Administration degree completion program is to provide students, even traditional-age students, who are working full-time with the opportunity to earn an academic credential that enables them to secure employment that satisfies their career and financial goals. In the past three years, we have gathered student and job vacancy data and used it to understand our students' needs and make decisions about adapting the BBA program to meet them. Data collection and program review will be an ongoing continuous process.

Furthermore, this review cycle has taught us that we must continue to grow our community college partnerships. In some cases, growing partnerships will require adding new community college partners. The partner relationships may involve students transferring to us from those schools or our recruiter/advisor recommending interested students complete general education or business foundation courses at the partner institution. We also cannot forget the opportunities presented by employer or corporate partnerships. Corporate partnerships benefit three entities—our BBA program, the employees, and the employers. Often, employers are willing to fund their employees' education, and that type of investment reduces an employee's debt load and removes a barrier to furthering their education.

As leaders of the BBA program, we will continue to support the work of the BBA recruiter/advisor. The role he plays in student retention cannot be minimized. Individual faculty do not have constant contact with every student from their start in the program to their finish. Moreover, because of that connection, the recruiter/advisor is in a position to provide student feedback to faculty during the monthly and annual faculty meetings.

Finally, we renew our commitment to an annual program review. Implementing a continuous review process will alert us to changes in student demographics and economic and employment trends. We can use that information to align

our existing resources or request additional resources to accommodate those trends. Accommodating those trends may require adjusting our recruiting, marketing, and advising strategies and redesigning the curriculum again. We must be open to change and look for ways to market our BBA program effectively to support our recruiting efforts.

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AUTHORS

Kathy Richie, D.M., is a Management and Entrepreneurship Department associate professor at Minnesota State University, Mankato. She teaches courses in leadership, organizational behavior, and strategic management at the undergraduate level in both the B.S. and BBA programs. Dr. Richie was one of the team members who developed the BBA program for the College of Business.

Claudia H. Pragman, Ph.D., is a professor of Management and Entrepreneurship at Minnesota State University, Mankato. She teaches statistics in the MBA program and courses in operations management at the undergraduate level in both the B.S. and BBA programs. Dr. Pragman was also one of the faculty members who developed the BBA program for the College of Business

A Project-Based Learning Approach in an Accelerated Online Global Supply Chain Management Capstone Course

Bulent Erenay, Northern Kentucky University, Highland Heights, Kentucky, USA

ABSTRACT

In this study, a project-based experiential learning approach is proposed for a capstone course in an accelerated online undergraduate Global Supply Chain Management program. The course integrates project management skills, teamwork, collaboration, organization, problem-solving, decision making, time management, and Six Sigma skills in the development of a new product and the design of its end-to-end supply chain. Key components of the course include project management, product development using Design for Six Sigma tools, sourcing strategies, manufacturing system design, distribution and warehousing planning, and financial analysis. Tools such as responsibility matrix, meeting minutes, progress reports, and self and peer evaluations are employed to foster a culture of accountability and enhance organizational skills. Positive student feedback underscores the course's practical relevance and its impact on job readiness.

Keywords: Project-based learning, supply chain management, online education, adult learners, group project, teamwork, product development, experiential learning, Six Sigma

INTRODUCTION

Supply chain management has been a buzz term, particularly during and after the Covid-19 pandemic, with supply chain disruptions significantly affecting daily lives of households. Supply chains are complex systems that integrate various entities such as suppliers, manufacturers, warehouses and distributers to fulfill customer requirements (Erenay, 2016). As the demand for supply chain professionals grows, the Bureau of Labor Statistics (BLS) projects an annual increase in logistics employment of 18% from 2022 to 2032 (BLS, 2024). In response, supply chain management education is adapting to include new trends and better prepare students for future jobs (Drake *et al.*, 2023). Aligning supply chain programs with the practical needs of the supply chain industry is highly important. A recent survey by the Association for Supply Chain Management (ASCM) revealed that 54% of the supply chain professionals believe project management skills are critical for success in the field (ASCM, 2023).

In supply chains, decision-making is crucial and involves a wide range of activities, from sourcing and inventory control (Paleshi *et al*., 2011) to manufacturing (Erenay and Suer, 2015), transportation, logistics, and distribution (Celikbilek *et al*., 2015). Each step involves its own set of risks. The capstone project, which reinforces concepts covered throughout the GSCM program, is a requirement for all GSCM undergraduate students. Students apply numerous supply chain management concepts by designing end-to-end supply chain for an innovative product developed using Six Sigma and project management tools. It is a student-led work which requires team work, research, communication, self-learning, and discipline-specific skills. The project is graded based on students' overall grasp of these concepts and their use of Six Sigma, SCM, and project management tools.

PREVIOUS RESEARCH

Studies indicate significant gaps between the skills and competencies provided by business colleges and the needs of the industry, with emphasis on the growing significance of soft skills such as teamwork and interpersonal abilities in the workplace, and recommend team-based activities instead of traditional exams (Alshare and Sewailem, 2018). Employers need people who are good at working in teams, however educators do not always teach these skills at universities (Willey and Gardner, 2006). Time management, collaborative learning, teamwork and problem solving are listed among key supply chain management graduate skills (Jordan and Bak, 2016). Moreover, the ASCM (2023) identified critical thinking (43%), collaboration (43%), time management (26%) as top emotional intelligence skills required for SCM professionals.

The Project Management Institute (2017) defines project as "a temporary endeavor undertaken to create a unique project, service, or result". Projects necessitate the project team members to complete a set of tasks to achieve an end goal within a specified time period. Project management requires application and integration of knowledge; hence project management skills are highly desired within any industry (Kerzner, 2017). Project-based learning is among the recent educational approaches used to engage students alongside simulations, group work, and gamification (James *et al*., 2020; Vanany and Syamil, 2020; Bell, 2010). Although, project management is offered in many business colleges, however, not all of the students in the GSCM program take it since it is an elective course.

In the PBL, projects are led by students and the instructors act as coaches to the project teams. PBL helps students understand their lessons better by doing hands-on projects that relate to real-life situations, which allows them to have deeper connections with the lecture materials and develop problem-solving skills (Kwietniewski, 2016; Maddi *et al*., 2013; Smith and Gibson, 2016). PBL prepares students for the workforce by improving collaboration, self-management, critical thinking (Kwietniewski, 2016), as well as problem-solving abilities by encouraging them to lead their own learning and collaborate on projects (Bell, 2010). Project-based learning has been effectively employed in many university courses including business informatics (Paľová and Vejačka, 2022), simulation (Egilmez, *et al*., 2018), data-base management (Dixit *et al*., 2022), entrepreneurship (Johann *et al*., 2006), marketing ((Kwietniewski, 2016), data visualization (Kammer *et al*., 2021), marketing communications (Dušek, 2020), and project management.

PBL is utilized in supply chain management education as well. Maddi *et al.* (2013) implemented PBL in an engineering supply chain management class to design a motorcycle and supply management of the product. Other studies have focused on global supply chain coordination (Kopczak and Fransoo, 2000), consulting (Roethlein *et al*., 2021), e-commerce (Les *et al*., 2008), procurement (Foulds *et al*., 2008) and commodity price risks (Zsidisin *et al*., 2013). No existing studies have focused on teaching a project-based course that encompasses the design of a product's entire supply chain, incorporates Six Sigma skills, and utilizes project management tools. This study offers an experiential learning approach in a group setting for students in online education.

THE PROPOSED PROJECT-BASED CAPSTONE COURSE

The proposed project-based learning in online GSCM capstone course equips students with essential skills such as teamwork, effective communication skills, planning and organizing, leadership, time management, critical thinking, problem identification and solving skills. Students are required to develop a new product using Design for Six Sigma (DFSS) tools, design an end-to-end supply chain for the product, and use project management tools throughout the project.

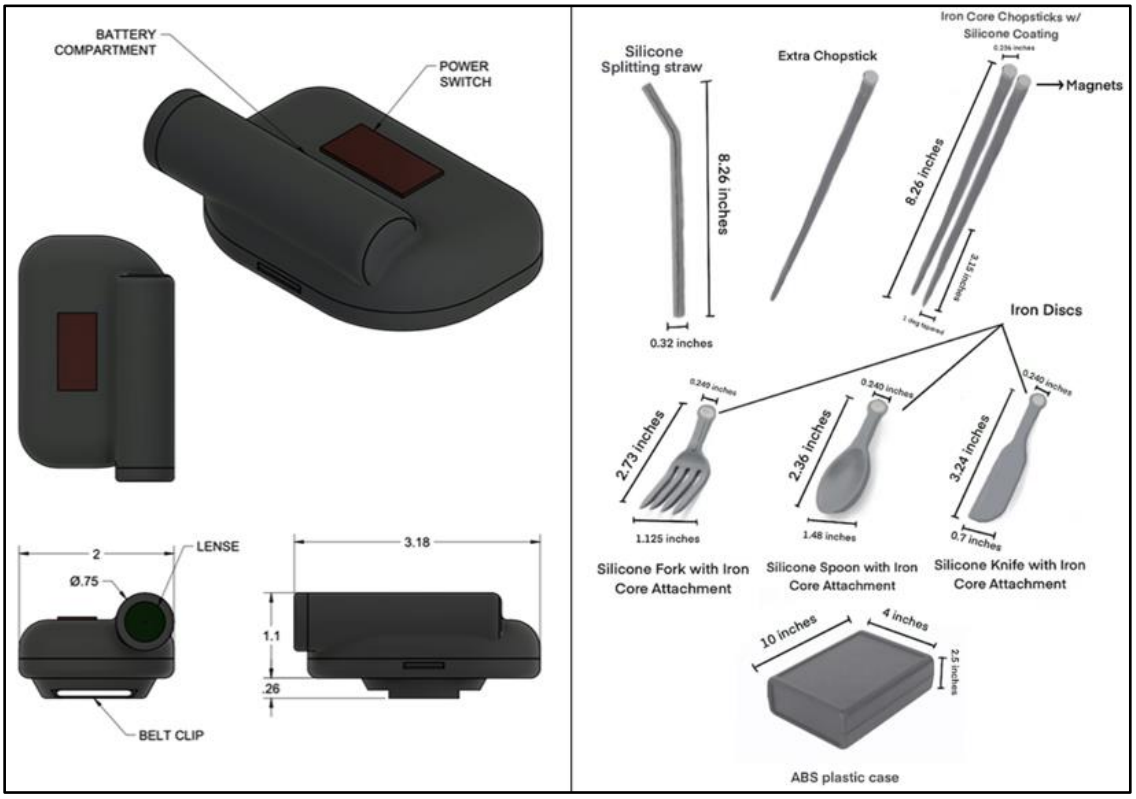
Students form their project groups in the first few days of the semester, following the provided instructions. It is strongly encouraged to form diverse groups that consider factors such as work experience, project management knowledge or experience, and gender and nationality. Students provide this information through their introductions in the first module of the learning management system. Additionally, they are required to submit an updated resume, which serves as an information source to the instructor who approves the final formation of the groups.

The scope of the project is to create a detailed and realistic project proposal and supply chain design for preferably an innovative product. The project runs on three pillars: new product development using DFSS methodology, end-to-end supply chain design for the product, and the use of project management tools while developing products and their supply chains. The supply chain design of the proposed product includes project tasks such as bill of materials, supplier networks, raw material or component costs, lead times, facility location analysis, manufacturing system design, Process Failure Mode and Effects Analysis (PFMEA), distribution systems and warehousing. While designing the product and supply chain and operations, project management tools, such as project charters, Work Breakdown Structure (WBS), RACI charts, Gantt charts, etc., are used. The project culminates in an online presentation at the end of the semester to an audience that includes of the class, the GSCM faculty, all GSCM students, and guests of the students.

Figure 1 shows two examples from projects completed in previous semesters. Although students are encouraged to prepare the designs using software such as Microsoft Visio, SolidWorks, or AutoCAD, they are permitted to submit clear hand-drawn sketches. Additionally, they are allowed to seek professional help for their drawings. Below is a list of some of the projects completed by the project groups.

- Laser Device: Aids in maintaining social distancing.
- Reusable Utensil Set: Promotes sustainable dining practices
- Tethered Dog Toy: Ensures pets enjoy play without losing their toys.
- Eco-Friendly and Sustainable Yoga Mat
- Reminder Device for Car Seats: Attached to car seats to warn mothers not to forget their babies in the car.
- Scented Couch Cover
- Scented Heavy Blanket
- COVID Kit Belt: Designed for warehouse workers to carry essentials like masks and sanitizer.
- Resealable Chip Bag: Offers a solution to keep snacks fresh longer.
- Phone Case Wallet: Combines the utility of a wallet with the protection of a phone case.
- Magnetic Belt: Secures cell phones directly to a belt for easy access.
- Convenient Condiment Carrier: Allows easy transport and use of condiments.
- Eco-Friendly Laundry Pods: Offers a sustainable alternative for laundry detergents.
- Knife Utensil Set: Combines multiple cutting tools into a single, convenient set.
- Customizable IV Case

Figure 1: Examples to the products developed: laser social distancing device and reusable utensil set



Project description

The project begins with brainstorming to identify a need, or problem, or opportunity, that is not addressed by the existing products in the market. Market research is the first step in new product development in the DFSS methodology. The project teams may gather primary data by developing surveys, or use secondary data from various

sources to understand and present customer needs and expectations. This data is used to capture Voice of Customer (VoC), employ Quality Function Deployment (QFD) and create House of Quality (HOQ), and perform KANO analysis. Simultaneously, several designs are developed based on the VoC. The functional requirements from the HOQ are used to compare these designs and determine the best one using a Pugh Matrix. The chosen design is then used to develop a Bill of Materials (BOM), marking the first step of the supply chain design.

The supply chain part of the project begins with a Bill of Materials (BOM), where students must determine the number of materials/components required for a single unit of the product. After identifying the required materials, a sourcing strategy is developed. Based on this strategy, suppliers are found and contacted to get quotes and find information about purchasing costs, minimum and/or optimal order quantities, manufacturing and/or transportation lead times, transportation costs, tariffs, customs fees, and other relevant regulations. The project requires the use of both domestic and international suppliers in order to experience in conducting business within the US and internationally.

Table 1 presents the key activities in each module. Repetitive tasks, such as meeting minutes, project progress reports, online meetings, and discussions are not listed. It is important to note that some activities span across multiple modules.

Table 1: Modules and key activities in the accelerated online GSCM capstone course

MODULE	KEY ACTIVITIES AND TOPICS
1. Project Mobilization, Product and Market Research	Project team contract, Basics of DFSS and Project Management, Product ideas and selection Start: Project charter, Market research
2. Project Management tasks, Market Research	Project Charter, RACI chart, Market Research Self and peer evaluation Start: QFD, WBS, Sourcing decisions
3. Sourcing decisions, Work Breakdown Structure, and QFD	QFD and Kano analysis, WBS and Gannt Chart, Bill of Materials Interim report Continue: Sourcing decisions Start: Process mapping of manufacturing system
4.Sourcing decisions, process maps	Sourcing decisions and suppliers, Process map of manufacturing system, Conceptual designs and Pugh matrix, Societal and Environmental Impacts Self and peer evaluation Start: VSM, Manufacturing system design, Distribution and warehousing planning
5. Manufacturing system design and Value Stream Maps	Manufacturing system design, VSM, PFMEA Continue: Distribution and warehousing planning Start: Order to cash cycle, financial feasibility analysis
6. Warehousing and Distribution	Distribution and warehousing planning, Order-to-cash cycle, Financial feasibility analysis Self and peer evaluation
7. Project Closure and Final Presentation	Project Closure and Lessons Learned from the project, Project Report and Presentation (open to faculty, students, and guests) Overall Self and Peer Evaluation in Capstone Project

Project teams conduct research on the resources required for manufacturing, such as machines, tools, conveyors, forklifts, labels or labeling machines, packaging machines and materials, and begin sourcing suppliers for these components. The initial step involves creating the process map of the manufacturing system, followed by developing a value stream map (VSM). Next, teams are required to determine labor and manufacturing resource requirements based on expected sales volumes for the products. They must also discuss suitable key performance indicators for the manufacturing system, such as cycle time and expected capacity utilization. Process Failure Mode and Effect Analysis (PFMEA) is conducted for the manufacturing system to identify the potential failures that could

impact the reliability of process steps, product quality, and customer satisfaction which may result from materials, machines, workers, etc., Mitigation strategies are also developed at this stage. Additionally, teams are tasked with

locating a real facility in the Greater Cincinnati- Northern Kentucky region that meets their manufacturing needs and warehousing needs.

The next step is distribution and warehousing planning for the finished products. Teams have two options: hiring a third-party logistics provider (3PL) or operating their own distribution system. In either case, they must determine the associated costs with their chosen approach. Similarly, regardless of the choice, an inventory policy for their products must be developed. Furthermore, the project teams develop Order-to-Cash (OTC) cycle using ASCM's SCOR model. OTC involves all of the activities from the receipt of an order by a seller to the delivery of the product to the buyer, including the flow of funds back to the seller based on the invoice. Reverse logistics is also planned during this phase, and the costs associated with reverse logistics are estimated, which is then reflected in unit costs.

Many of the project tasks span across multiple modules. To better facilitate student planning for subsequent modules, preparation assignments for larger tasks are created in the learning management system. Students are encouraged (but not required) to complete portions of the work each week before the actual due dates of these assignments. Examples of these spanning tasks include QFD, sourcing, manufacturing systems, warehousing, etc.

Project teams are required to calculate the unit cost of production, taking into account all related costs. These calculations must be based on the capacity required to meet the estimated or targeted demand. The cost factors to be included are labor, materials, machine costs (depreciation cost), packaging, distribution and reverse logistics, overhead costs, and other related costs. At minimum, teams are expected to conduct a benefit-to-cost ratio analysis and a break-even analysis.

While completing project related tasks, project teams must use project management (PM) tools. They begin by preparing and signing a team contract, which is a mutual agreement among team members on a set of rules and norms regarding goals, meetings, group decision making. Furthermore, each member submits an Assurance of Project Success document, which outlines actions they will take to ensure project success and prevent failure. Project teams develop a project charter and responsibility matrix to plan and assign tasks for upcoming modules. A Work Breakdown Structure (WBS) and WBS dictionary, along with a Gantt chart showing the project's critical path are prepared utilizing Microsoft Project or other relevant software. Teams are required to submit meeting minutes and project progress reports weekly, discussing tasks and project progress, obstacles, and solutions. The lessons learned at these documents are subsequently used to compile the Lessons Learned section of the project report.

Societal and Environmental Impacts: At this part, students conduct research and discuss potential societal and environmental impacts, as well as the ethical considerations of their projects. They are encouraged to use the impacts of similar products as benchmarks while exploring these issues.

Assessment

The assessment tools used in the GSCM capstone course encompass project tasks, discussions, participation, the final project report and presentation, and engagement with supply chain webinars/podcasts. Students are expected to treat the project related documents as "live" documents that require updating whenever changes are made, whether due to project needs or instructor feedback. Students must include the final updated version of these tasks within the project report and address the changes during team meetings. The majority of the grades are derived from the project report and related tasks, with the project report and presentation accounting for 40% of the total grade.

Self and peer evaluations and group meetings

One weakness about group projects is the presence "free rider" students who do not interact with other group members and fail to fulfill their responsibilities (Rotondo, 2022). Such behavior disrupts team dynamics and can lead students to view group work as unproductive (Opdecam and Everaert, 2012). To deal with this issue,

Oosthuizen et al. (2021) recommend implementing peer evaluations and organizing team meetings with clear agendas and minutes.

In this project, students are required to submit self and peer evaluations biweekly starting from Module 2. These early assessments provide project groups with timely insights into their own and their peers' performance. Additionally, a comprehensive evaluation is conducted at the end of the course. All evaluations are confidential, viewed only by the instructor, and feedback is provided to the teams after each evaluation. This approach of

confidential self and peer assessments is designed to discourage free riding and measure each team member's contributions to the project.

The self and peer evaluation process consists of two parts. In the first part, students are required to answer open-ended questions reflecting on their learning experience. They discuss what aspects of the project went well, identify any changes they would make if given the opportunity, and provide general comments or recommendations for the project. The second part includes nine questions where the students assess themselves, and then their peers based on 5-point Likert scale. These questions evaluate various factors such as attendance in meetings, communication with group members, participation in developing ideas and planning project during meetings, willingness to discuss others' ideas, cooperation, interest and enthusiasm, leadership, timely and completion of tasks. If a student receives a score of 1 (out of 5) or consistently low scores for a particular criterion, a written explanation from the evaluators is required. In such cases, the instructor contacts the concerned team member to discuss their performance. Constant negative feedback about a team member significantly impacts their final grade.

Furthermore, students are required to meet at least once a week with a predefined agenda, and they must document and submit the meeting meetings along with project progress reports. Templates of meeting minutes and project progress report are provided in the lecture materials. Student feedback indicates that the groups often meet more frequently than required, and maintain constant communication through messaging apps on cell phones. The role of project manager, which rotates among group members weekly, involves delegating tasks and making final decisions in the event of disagreements. Role playing is considered to increase student engagement and promote team work and critical thinking in group projects (Donegan & Ganon, 2022). If a group is unable to resolve the issues internally, they are encouraged to contact the instructor, who acts as the project sponsor, for guidance.

Weekly Online Meetings

An online meeting is held weekly by the instructor at a specified time, determined via a survey that includes evening options before the semester starts. Historically, all meeting times have been scheduled in the evenings, accommodating the majority of students in the accelerated online program who are adult learners with daytime work, family and other obligations. While attendance at these meetings is not mandatory, students are strongly encouraged to participate the meetings at the designated times. Recognizing that not everyone may be available, the online sessions are recorded and made accessible for later viewing. Students unable to attend the meetings are required to watch the recording and write a reflection paper on it.

During these meetings, each team delivers a brief presentation about their project progress, receiving feedback both from the instructor and other teams. Tasks for the current and upcoming modules are reviewed briefly, and the instructor addresses any student questions. Furthermore, as many of the students are working professionals, they are encouraged to share their work and internship experiences. Guest speakers with diverse expertise in SCM industry from across the US are also invited to these meetings, enhancing networking opportunities for students.

Collaboration and Networking

At the beginning of the class, students are required to create a RACI chart, a valuable tool in project management used to define roles and responsibilities for project tasks. RACI stands for Responsible, Accountable, Consulted, and Informed. To increase collaboration and prevent conflicts within groups, each major task must be assigned to two 'Responsible' group members who directly handle the task. Additionally, one 'Accountable' member reviews the work to ensure it meets or exceeds expectations. The instructor plays a role in every task, either as 'Consulted' or 'Informed'.

Furthermore, each group must create an MS Teams team and store all project documents in MS Teams folders. These folders are accessible to the instructor and other project groups, who act like stakeholders in the project and are designated as 'Informed' on the RACI chart to promote inter-group collaboration. Since each team works on a unique project, teams are encouraged to collaborate, benefiting from the distinctiveness of each project management and SCM task.

STUDENT FEEDBACK

Student feedback from formal course evaluations for the course is overwhelmingly positive. They appreciated the practical application of theories, highlighting the blend of academic and real-world skills. They found the detailed

project work and hands-on assignments with suppliers particularly beneficial, offering a close look at professional practices. Feedback emphasized the course's challenge, pace and intensity, yet students acknowledged significant learning and real-world readiness as major advantages. The interactive elements such as group work, weekly meetings, and instructor feedback were praised for enhancing learning and engagement. Overall, the course was praised for its effectiveness in preparing students for SCM roles, making it a memorable and valuable part of their educational experience. Since the introduction of the self and peer evaluations, group performance has notably improved. Here are some excerpts from the students:

- "This class requires decision making and team work. In my opinion it's easy to get lost in theory and forget about application in university. This class blends the two nicely and really focuses on application, which is my preferred learning style."
- "The level of detail for the project was excellent. It was a great way to gain practical experience using the tools we've learned so far."
- "The supplier and sourcing assignment I felt was the most beneficial assignment and lesson within this course as we got to get in contact with numerous suppliers and gain real world experience on how a supplier selection would go"
- "I first want to say that your class was one of the best I have taken at university. I learned a lot in the 7 weeks and have been able to use some of what I learned in the internship I am in now, so thank you for that."
- "This class was very challenging but it will be worth it in the end. It encouraged me by acting as if this was a real project. It wasn't a case study from a text book."
- "It was a lot of hours, but I've learned more in this course than any other I've taken before."
- "The assignments made me apply what I've learned throughout my time at university. It was great to revisit some, as well as learn new content."
- "Overall, I felt that the whole course was very beneficial and gave a real world feel in what to expect in supply chain related job"
- "I think this course is wonderful. I wouldn't change anything and I would continue adding more content. This is by far the best course I have taken and one I will never forget."
- "Challenged us and provided feedback in a constructive way. Overall, he has been my favorite professor given his attributes and attitude when it comes to teaching."
- "The progress reports and meeting minutes allowed for concise timing of responsibilities. The general crafting of documents gave me an understanding of the professional quality expected for future employers using the same documents for operations."
- "All members of my group were great and interactions with the instructor and classmates were pleasant and professional."
- "Assignment descriptions were a great tool used to convey the quality of work expected as well as resources to make sure we adhered to those expectations."
- "All project deliverables were terrific experience in what I presume to be professional documents prepared for something of a similar nature."
- "The entire project; it pushed me and gave me real world application to developing a supply chain from the ground up."
- "The instructor was very helpful whether it was feedback on assignments or giving plenty of opportunities in lectures to ask questions."
- "The weekly meetings and that he was always willing to spend more time with us if we needed it."
- "He did have timely feedback on assignments which were nice. Although this was an online course. I liked having the one zoom call a week to discuss what is going on. Being able to view other groups work to compare it to your own was nice."

DISCUSSION and CONCLUSIONS

In this paper, we propose a project-based experiential learning approach for a supply chain management capstone course designed for accelerated online students. The course leverages Project-Based Learning (PBL) to promote project management skills, including project planning, Gantt charts, RACI charts, teamwork, collaboration, problem solving, decision making and time management. Additionally, the project provides Six Sigma skills such as Quality Function Deployment (QFD), process mapping, value stream mapping, and Process Failure Mode and Effects Analysis (PFMEA). Most importantly, students have the opportunity to apply their supply chain management knowledge to a realistic project. They engage in comprehensive activities such as creating bills of materials, sourcing domestic and international suppliers and obtaining quotes, conducting facility location analysis, designing manufacturing systems, planning for labor, machines, and tools, sourcing packaging needs, designing product distribution networks, and creating reverse logistics systems—all while utilizing real data. Moreover, the use of online meeting platforms such as Zoom and MS Teams enables the integration of guest lecturers with expertise in various SCM fields into the weekly meetings.

The project presented significant challenges as well. A primary challenge arises from the course being entirely online, which adds an additional layer of complexity to teamwork and collaboration. Furthermore, as an accelerated course spanning only seven weeks, students are required to quickly adapt and meet project expectations from the very first week. Additionally, many students are adult learners with family and work obligations, making frequent meetings and consistent communication challenging. Finally, students need to revisit and apply the knowledge acquired in previous supply chain management and other business courses. To alleviate these difficulties, course requires students to meet weekly to plan for the project tasks, maintain meeting minutes and submit progress reports. The use of MS Teams facilitates the storage and sharing all project-related documents for all stakeholders.

Overall, the course offers a practical, immersive experience that effectively prepares students for the job market in supply chain management. The level of positive feedback through formal evaluations and post-course feedback from the students underscores the benefits of the project. Notably, students have reported that the project was frequently discussed during job interviews, highlighting its relevance and impact. At the course's conclusion, we solicit recommendations from students through formal evaluations and via email after grades have been distributed. The course has evolved significantly since its inception, and we aim to further improve it in future semesters. More tasks related to supply chain management will be incorporated to improve the setting provided in Table 1.

For future research, surveys could be designed to measure the impact of the project on soft skills such as teamwork, time management, organization, as wells as hard skills including specific supply chain tasks and Six Sigma proficiency among students completing the course. Similarly, these surveys could be employed to evaluate the long-term effects on GSCM alumni.

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AUTHOR:

Bulent Erenay, Ph.D., is an assistant professor of Supply Chain Management in the Haile College of Business at Northern Kentucky University. His research interests include supply chain management, manufacturing systems, franchising, information systems and data analytics.

A ChatGPT Developed Webpage Based Roulette Simulation to Teach Business Students Probability and Expected Value Concepts

David Weltman, Texas Christian University, Fort Worth, TX USA

ABSTRACT

An understanding of probability and statistics forms a crucial foundation for business students, many of whom will pursue careers that involve data analysis. Teaching probability concepts, however, can be quite challenging for instructors. Students may find the topic dry or boring and are intimidated by esoteric formulas. To address this challenge, this teaching brief describes an active learning, webpage-based simulation to help students grasp basic ideas regarding probability and expected value calculations. By using games of chance, we are able to more readily capture students' interest and engagement. The simulation-based application described in this brief is easy for students to understand and use, provides real time visualizations of important game metrics, graphically illustrates the law of large numbers, and supports theoretically derived results. This research demonstrates that webpage-based, gaming simulations can be engaging and effective in teaching students probability principles. The application was developed using prompts in ChatGPT3.5 and is available on GitHub.

Keywords: Teaching Statistics, Probability, Simulation, Expected Value, Active Learning

INTROCUCTION

There are several excellent articles that outline how to teach students statistical concepts using simulation and roulette. Simulations have shown to be effective in enhancing student learning in probability by giving them the ability to actively engage in a decision-making process, as described by Weltman et al. (2021), for example. The binomial distribution can be used to develop a betting strategy in roulette as Croucher (2005) exhibited. Roulette may be used to calculate probabilities for independent events, demonstrate the addition rule for mutually exclusive events and develop expected value calculations as shown by Marshall (2007). Excel-based roulette simulations have been built to give students the opportunity to try out various betting strategies over many trials as was done by Barr and Scott (2013) and Seal and Przasnyski (2005).

Our work builds on these foundations using simulation with an easy-to-understand single betting strategy. We provide evidence that this technique is engaging and enhances student learning, as a structured assessment of effectiveness is performed with positive results. Additionally, this work further validates that simulated results come close to theoretical expectations as would be expected from the Law of Large Numbers (LLN), described in detail in the Application of LLN section of the paper. Our work is a basic webpage-based simulation developed entirely using ChatGPT prompts. To access the application, students simply go to a URL provided.

Basic probability principles, discussed in this article and the aforementioned ones, form important foundations of analytics and data science. These concepts are integral for students continuing their studies in subsequent courses. But of course, probability theory can be intimidating for students as described by Wathen and Rhew (2019), especially those in required introductory business statistics. Thus, it is challenging for instructors to teach these important foundations effectively, such that students obtain a good understanding of concepts and how to apply them in practice. Pedagogical research demonstrates that use of various simulation-based class exercises serve as innovative and effective ways to convey such concepts as shown by Evans (2000) and Weltman and Tokar (2019), for example.

The application described in this paper builds on works performed by Seal and Przasnski (2005) which develops important probability formulae and validates conceptual measures with simulation, Barr and Scott (2013) and Marshall (2007) who have written about using roulette to teach students probability fundamentals. Our work provides additional evidence of the effectiveness of using this gaming application example in an easy-to-understand setting. We implement a simple betting scenario to facilitate understanding of the concepts (determining probabilities, expected value, and the law of large numbers). Our application displays tables and graphs that change in real time as more spins are played, which is visually appealing for students. We implement a survey to assess the effectiveness of the application.

The paper is organized as follows: the Workshop Scenario section provides an in-depth description of the application/workshop. The Application Platform section gives an overview of the application platform and its implementation. The Conduction of the Workshop section covers the implementation of the workshop in a class setting and any prerequisite topic coverage provided. The Assessment of Student Perception section presents results from student feedback. The final section contains concluding remarks.

WORKSHOP SCENARIO: ROULETTE

Roulette is a game of chance in which a wheel is spun, and a small ball is dropped onto the wheel, landing in one of 38 possible spots. Our application uses the American roulette wheel and board, which consists of numbered spots 1 to 36, zero, and double zero. The chance of the ball landing in any one spot is one in thirty-eight. On an American Roulette Board eighteen spots are red, eighteen spots are black, and two spots are green. Players can place bets on a single or multiple numbers, as well as nine group bets. For the purposes of this exercise, we focus on a single $100 group bet (a red outcome). If the bet is won, the player will recoup their initial bet and earn profit equal to the amount of their initial bet ($100). If the bet is lost, the player loses the amount of money they had bet ($100).

In our application $100 is bet on a red outcome for every spin. Table 1 shows an example of 5 spins and the resulting accumulated winnings or losses.

Table 1: Example of Spins Won and Lost

Spin	Bet Amount	Bet On Color	Spin Outcome	Spin Winning/Loss	Accumulated Winnings/Losses
1	$100	Red	Black	($100)	($100)
2	$100	Red	Green	($100)	($200)
3	$100	Red	Red	$100	($100)
4	$100	Red	Red	$100	$0
5	$100	Red	Red	$100	$100

Table 2 below is a list of symbols and variables with descriptions that are used in our implementation.

Table 2: Symbols and variables

Spin	A single outcome with a color and number associated with it
p	The probability of winning a spin
q	The probability of losing a spin
x	The amount of money won or lost in a spin, +$100 or -$100
E(x)	The expected amount of money won or lost in a spin

There are 38 total possible outcomes with 18 red, 18 black, and 2 green. The probabilities of a spin having an outcome of a particular color are given by,

$$P(Red\ Outcome) = \frac{18}{38} = 0.4737,$$

$$P(Black\ Outcome) = \frac{18}{38} = 0.4737,$$

$$P(Green\ Outcome) = \frac{2}{38} = 0.0526.$$

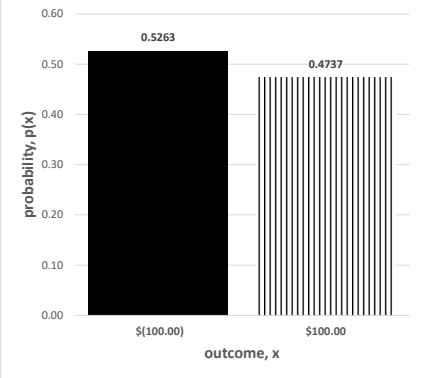
These probabilities are fixed and reflect the number of ways that an outcome can occur divided by the total number

of possible outcomes. When a player bets on a red outcome, there are 20 outcomes corresponding to a loss (the 18 black plus the 2 green slots) so that the probability of a loss on a single spin is, $20/38 = 0.5263$ and the probability of a win on a single spin is $18/38 = 0.4737$. The expected value of a single spin is negative and given by equation (1) below:

(1) $E(x) = \sum xp(x)\ for\ all\ x = +\$100(0.4737) - \$100(0.5263) = -\$5.26$

Figure 1 below depicts the associated discrete probability distribution for our application.

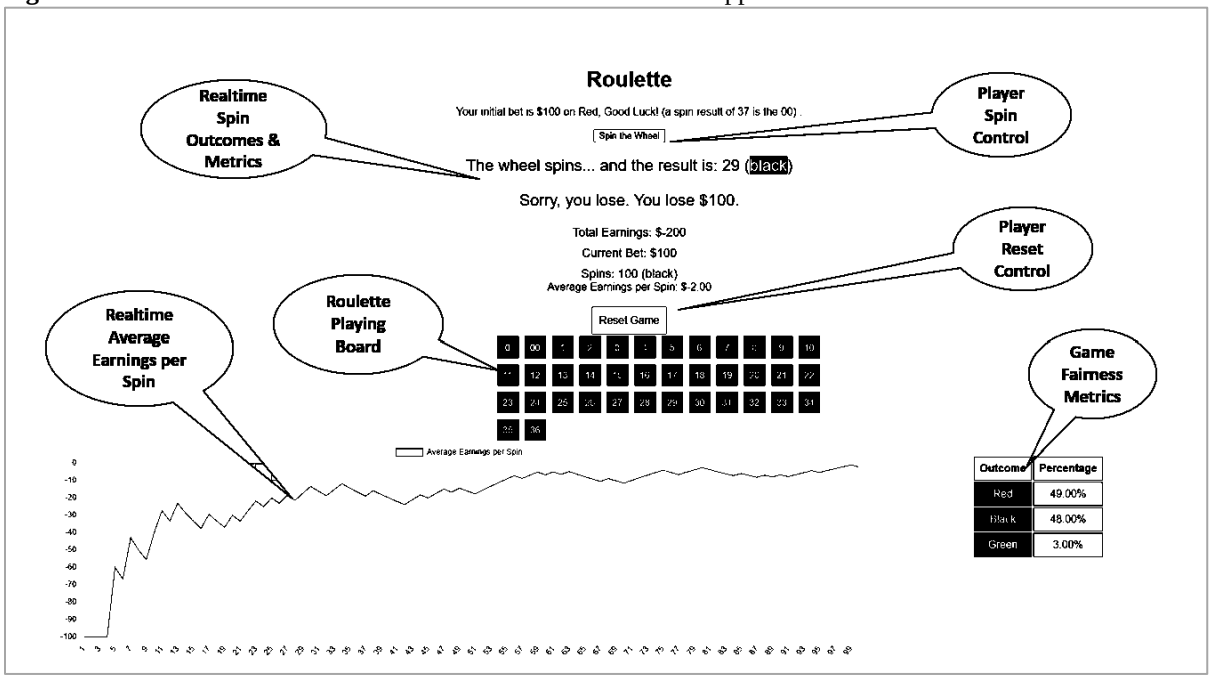
Figure 1: Scenario Discrete Probability Distribution



APPLICATION PLATFORM

We created the simulation exercise in html using ChatGPT3.5 prompts. The authors have minimal programing experience and wished to determine if an easy-to-use webpage-based application could be developed in a short amount of time with the free version (3.5) of ChatGPT. The application was developed in approximately 10 hours and is available on GitHub, https://statsrfun.github.io/Roulette/. Students work with the application by using control buttons shown below in Figure 2. With cues provided by the instructor and a little practice, the application quickly becomes intuitive and easy to use.

Figure 2. Application Dashboard



Note: The Application Dashboard is appropriately colorful in any standard browser.

To use the application, the player clicks on ***Spin the Wheel*** button repeatedly. The application displays the number the ball lands on as well as its color (red, black, or green). Whether the spin was won or lost, the amount won or lost, the accumulated earnings, and average earnings per spin. As more games are played several metrics are updated and displayed which are described subsequently. The game is designed to be played for about 250 spins, but there is leeway for additional spins. Faculty or researchers may modify, customize, or distribute the application without any additional permissions from the authors.

In the example shown in Figure 2 of 100 spins, the expected loss of $526 may be calculated by multiplying the number of rounds completed times the expected loss per round:

$$100(-\$5.26) = -\$526$$

The expected earnings per spin is -$5.26 as was shown in equation (1) and the actual average earnings per spin is simply the total earnings divided by the number of spins:

$$-\$200/_{100} = -\$2.00$$

To demonstrate the fairness of the application, metrics are accumulated after each spin and shown in a table in the user dashboard, Figure 2. The metrics in the table in Figure 2 visually show the actual percentage of spins for each color outcome. As more spins are played, the actual percentages approach the expected percentages; 0.4737 expected percent of red outcomes, 0.4737, expected percent of black outcomes, and 0.0526 expected percent of green outcomes, as described previously.

Actual average earnings per spin are calculated and displayed in the dynamic line graph in the Application Dashboard, Figure 2. Students visualize their average earnings move up or down as rounds are completed. Over more and more spins, the line tends to stabilize and if enough spins are played, theoretically around the expected average earnings per spin amount.

As faculty teaching introductory business statistics, we are continuously seeking ways to actively engage students in course content. In this instance, important foundational probability and expected value concepts that occur in this course and in other discipline specific courses throughout our business school. Easily accessible, webpage-based applications are very familiar to students, so our efforts focused on developing such a simulation exercise. In 2023 it became widely known that one of the areas where ChatGPT excels is in programming productivity. Thus, we decided to use this platform to develop our roulette simulation application. We had very limited to no knowledge of programming in Hypertext Markup Language, HTML, the language standard for webpage application creation. Building this application was an enjoyable experience. To obtain a good working first draft application it took about 20 prompts. We never had to directly modify or code any programming statements in HTML. All code development and modifications were made using prompts to an on-going ChatGPT session that was referenced and built upon over the course of the development. The process was iterative, copying generated code into a browser, testing it, then going back to prompting ChatGPT with necessary modifications. For those considering developing exercises like this one, we found GitHub to be an excellent, free, and convenient location for hosting our application source code. A GitHub webpage address (https://statsrfun.github.io/Roulette/) is easily generated for students to explore the application.

CONDUCTING THE WORKSHOP

We now describe implementation of the workshop in a class setting along with prerequisite topic coverage.

Prior to use of the application, instructors should cover basic ideas and concepts in probability including discrete probability distributions. Students should be familiar with experiments and outcomes such as the roll of a die with outcomes; 1, 2, 3, 4, 5, or 6. Students should be familiar with independent events and can calculate basic probabilities associated with independent events such as determining the probability of obtaining three heads' outcomes in a row in a coin toss experiment. A probability distribution is a mathematical function, table, or graph that depicts possible outcomes with associated likelihoods in an experiment. For a discrete probability distribution, the possible outcomes are limited, fixed, or finite. The mean or expected value of a discrete probability distribution can easily be obtained by multiplying each outcome value, *x*, by its corresponding probability and then summing up all the resulting products

as previously described in the Workshop section, equation (1).

Also, as prerequisite, students should have a broad sense of the law of large numbers concept, one of the most important concepts in probability and statistics education. Informally, the idea around the law of large numbers is that the more times an experiment is performed, experimental results should get closer to theoretical expectations. The law of large numbers is discussed further in the subsequent section. Our application illustrates the law of large numbers (LLN) in both tabular (the table of expected outcome percentages) and graphical (the line chart of average earnings per spin) forms for students.

Once these concepts in probability have been overviewed in the course, students are ready to start working with the application. First, the instructor should demonstrate the application which is available on GitHub at https://statsrfun.github.io/Roulette/. The instructor should play several spins and discuss the results. Each time the ***Spin the Wheel*** button is clicked, the resulting number and color outcome is clearly displayed. On the next line, a win or lose status message is shown with the amount won or lost, which will always be (+/-) $100 since this is the amount bet for every spin. The next line shows the total accumulated earnings and subsequent messages display the total number of spins and the average earnings per spin calculation. Whenever desired, the game may be reset by clicking on the ***Reset Game*** button, which clears all calculations, tables, and charts. Following the instructor demonstration, students should go to the website, play several times and observe the real-time graph, table, and metrics. Then students are requested to reset the game and play a total of 250 spins. Students are asked to record the spin total (250), total earnings, and average earnings per spin. The instructor can then generate class discussion regarding various total earnings, average earnings per spin amounts, and percentage of red, black, and green outcomes obtained. Students can be asked to calculate the theoretical percentages for each of these metrics and compare these metrics to what they found in their application of 250 spins. In our workshop, we used a Qualtrics survey to collect this data and in a later class session show the class the overall results. In this session, the central limit theorem can be discussed, as the histogram of all the sample means collected result in a normal distribution with a mean of -$1315 (250 spins times -$5.26 expected loss per spin), as the theorem suggests.

Students are instructed to complete a survey regarding their experience with the platform. Quantitative and qualitative questions are asked to assess the experience and its learning potential. The results of the survey are discussed in the Assessment of Student Perceptions section of this paper.

APPLICATION OF THE LAW OF LARGE NUMBERS

One of the most important concepts in probability and statistics education is the law of large numbers. Our application illustrates the law of large numbers (LLN) in both tabular and graphical forms for students. Likely originally conceived by the Italian mathematician and gambler, Gerolamo Cardano (1501-1576) and further developed by the well-known Swiss mathematician, Jakob Bernoulli (1655-1705), the LLN implies that when one performs an experiment that involves defined probabilities for uncertain events, the more times the experiment is performed, the closer the actual observed empirical results will approach the theoretically defined probability. A simple example would be the experiment of rolling a single fair die. The probability of say a "3" or any outcome is 1/6. The LLN posits that the more times we roll the die, the proportion of "3" outcomes get closer to 1/6. In this application the LLN is illustrated in several ways. Students calculate the empirical percentage of times red (18/38), black (18/38), and green (2/38) outcomes are expected to occur. These percentages are compared to actual simulated outcome percentages as shown in the application dashboard. Students observe that as more spins are played and rounds completed, the actual and expected percentages tend to converge. Actual average earnings per spin are calculated and displayed for each spin in a line graph and can be compared to a theorical value of -$5.26. Actual red, black, and green outcome percentages are calculated and displayed in a table and as spins accrue. These metrics can be compared to theoretical percentages (0.4737 for red, 0.4737 for black, and 0.0526). Over more and more spins, students visual actual and theoretical metrics converging.

ASSESSMENT OF STUDENT PERCEPTIONS

We conducted a test exercise as part of this workshop development using 94 undergraduate business students of various majors enrolled in an introductory business statistics course at the author's home university. Approximately half the students were first year students (Freshmen), and half were second year students (Sophomores). There is no prerequisite for introductory business statistics and most students have limited or no prior background in statistics. The exercise took place in a regular classroom and was successfully carried out in a usual 50-minute class period. As described in the prior section, the instructor covered basic concepts of probability, an overview of the law of large

numbers, discrete probability distributions and associated expected value calculations, in earlier class sessions.

Overall, students responded well to the workshop experience. Comments were gathered from a post-game survey and were generally strongly positive. Students seemed to enjoy playing the game and working with the application. Representative comments include:

- *"It is interesting. Statistics in gambling is my favorite way to learn."*
- *"I thought the app was very fun and would love to do more activities like this."*
- *"I love this workshop and understand the problem more thoroughly."*
- *"The app was very useful in teaching this particular topic, the fact that it was so hands-on and that it dealt with roulette made this easier to comprehend and grasp."*
- *"The app helped me understand discrete probabilities and how roulette works. I think having different mediums of learning is beneficial because I am able to learn about the concept in one way or another."*
- *"I thought this was so fun! My earnings started off very strong but then rapidly started decreasing as played the game more. A good lesson that I should never gamble, and if I do - stop after I win!"*

We also asked students to indicate their response to a series of statements, rated on a 5-point Likert scale, (1 = Strongly disagree; 5 = Strongly agree). This technique has been shown to provide good and reliable results, Hensley (1999). Our findings are encouraging. Questions had a mean above 4.0, and for all items, most respondents selected "Strongly agree" or "Agree." For each question, the standard deviation is small (as a proportion of the mean), indicating a consistent level agreement in the participant responses. These results are presented below in Table 3.

Table 3: Student Assessments of Effectiveness (n=94)

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Standard Deviation
Found the workshop application enjoyable (as a learning activity).	54	31	5	1	3	4.40	0.89
Allowed me to experience first-hand important probability concepts.	54	33	4	1	2	4.45	0.81
The workshop was helpful in learning and applying important probability concepts.	49	38	4	2	1	4.40	0.76
Working with the app helped me learn about the Expected Value Concept.	45	33	9	4	3	4.20	1.00
Working with the app helped me learn about the Law of Large Numbers concept.	50	32	10	0	2	4.36	0.84

*5-point Likert scale used. Strongly Disagree = 1; Strongly Agree = 5.

To assess whether students could apply probability and expected value principals to a new business scenario, in the post-workshop survey we also presented a completely new problem for students to solve:

A company makes electronic gadgets. One out of every 50 gadgets are faulty, but the company doesn't know which ones are faulty until a buyer complains. Suppose the company makes a $3 profit on the sale of any working gadget but suffers a loss of $80 for every faulty gadget because they must repair the unit. Check whether the company can expect a profit in the long term. What is the Expected Value (Expected profit or loss) for 1000 gadgets sold over the next several months?

Sixty-seven out of the ninety-four students (71.3%) were able to come up with the correct answer of $1,340. We were

delighted to see that students could now apply this material to a new business application scenario.

CONCLUDING REMARKS

Simulation is a powerful and effective way for students to actively engage in sometimes esoteric statistical concepts and formulas. In this instance, we use ChatGPT 3.5 to develop a webpage application to engage students in learning about basic, foundational ideas in statistics: determining probabilities, independent events, the law of large numbers, discrete probability, and expected value. We have found that many students can relate to engaging games of chance. The game of roulette is popular and very easy for students to understand. For these reasons, we, and other instructors, deploy roulette in applications to support students learning about probability. Our application is visual and interactive, traits we believe are helpful for students. Participants gain a better understanding of basic probability concepts and have an active experience seeing sometimes mysterious formulas in action. Through our exercise, students gain important foundational knowledge that can later be applied in subsequent topics that are important in business statistics and analytics, as this knowledge is central to many decision-making methods. Further, for faculty who conduct executive or professional MBA education, this application is an excellent way to help senior managers understand foundational probability concepts in an interesting and engaging way.

It is the authors' opinion that teaching effectiveness and student motivation should be top goals for instructors in business analytics and statistics. We have found that students tend to be anxious about course materials in these domains. At the same time, due to the increasing importance of analytics as a job-acquiring skillset, students are more interested in learning these concepts than at perhaps anytime in recent decades. In order to capitalize on this increasing motivation among students and to provide effective learning, faculty need a richer and deeper toolbox of innovative instructional methods to present analytics and data science concepts. Innovative, interesting, and interactive activities have always been integral to teaching effectiveness. We believe our workshop is a good addition to materials for faculty who teach introductory probability concepts as part of a course in business statistics or analytics.

Through the webpage-based simulation exercise described in the paper, students gain a deeper understanding of foundational probability concepts along with a clear example application. These are increasingly important concepts in today's era of data driven decision making, where managers are frequently tasked with utilizing and interpreting probabilities. With easy-to-use simulation tools readily available, we continue to explore powerful ways of deployment in which students can actively experience foundational business statistical and probability theory.

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David Weltman holds a Ph.D. in Business Statistics and Master of Science Degrees in Operations Research and in Information Systems. He has been teaching courses in Business Analytics, Supply Chain Management, Business Statistics, and Operations Management at the EMBA, MBA, and undergraduate levels both in the U.S. and abroad for over 15 years. Prior to his academic career, David has over 15 years of business experience with IBM Corporation in Sales and Consulting Services primarily working with organizations in the distribution industry.

Forced Distribution Performance Appraisal: A Teaching Activity

Joseph Westlin, Minnesota State University, Mankato, Minnesota, USA
Kathleen Dale, Minnesota State University, Minnesota, USA

ABSTRACT

Performance appraisal is a common and necessary element of effective organizations. Business schools should provide students the knowledge and skills needed to accurately determine performance criteria and evaluate employee performance (Rubin & Edwards, 2020). This paper introduces an activity designed to teach students about forced-distribution rating scales. Within forced distribution rating scales, evaluators have a finite number of scores that can be assigned in high, medium, or low performance categories. Through this activity, students should learn how to navigate the ambiguity of performance appraisal and develop skills for effective and consistent interpretation of performance criteria.

Keywords: performance appraisal, forced distribution

INTRODUCTION

Training on how to conduct performance appraisals should be an important component in developing managerial competencies (Rubin & Edwards, 2020). A recent meta-analysis finds that rater training improves the accuracy of performance appraisals more so than changes to the appraisal instrument (Roch, Woehr, Mishra, & Kieszczynska, 2012). While textbooks in human resource management typically include a chapter about performance appraisal, acquiring knowledge of performance appraisal principles is very different from developing the skills needed to conduct effective performance appraisals (Smither, 2020). The purpose of this paper is to present an experiential exercise to help students develop important skills that are required to conduct a specific type of performance appraisal, the forced distribution performance appraisal, and develop an awareness of potential bias that may be inherent in this type of appraisal.

THE FORCED DISTRIBUTION PERFORMANCE APPRAISAL

When the performance appraisal will be used as a tool to make administrative decisions such as pay raises, promotions, or discipline, it is important that the assigned ratings allow managers to differentiate between levels of performance. Unfortunately, decades of research indicate that when ratings are used to make administrative decisions with significant positive or negative consequences, raters tend to inflate ratings, or inaccurately generalize ratings (Beenen, 2014; Jawahar & Williams, 1997; Murphy & Cleveland, 1995). These two biases are known as the leniency bias and the centrality bias (Prendergast, 1999; Bol, 2011). The leniency bias is the tendency of the rater to give a lenient rating (Saal & Landy, 1977; Blume, Baldwin, & Rubin, 2009). Meanwhile, the centrality bias is the tendency of raters to give a less differentiated rating between good and poor performers (Motowidlo & Borman, 1977; Prendergast, 1999). A major problem with the occurrence of these biases is that when high performance is not rewarded and low performance is not punished, employees will be less motivated to exert themselves (Berger, Harbring, & Sliwka, 2013). Further, research has shown that high performers tend to leave organizations where high performance is not rewarded while weak performers are likely to remain in the organization (Adler, Campion, Colquitt, Grubb, Murphy, Ollander-Krane, & Pulakos, 2016).

Organizations may opt to use the appraisal system to encourage differentiation in both the ratings given to employees and the outcomes of the ratings. This technique is grounded in expectancy and equity theories (Rubin & Edwards, 2020). Equity theory suggests individuals will view appraisal decisions as being fairer when there are more positive outcomes for positive performance (Blume, Baldwin, & Rubin, 2009; Latham, 2012). Similarly, expectancy theory suggests that employees compare their performance to the performance of their co-workers. When an employee perceives they are performing at a higher level than a co-worker but sees the lower-performing peer receive a similar rating and/or outcome, they will view the appraisal system as less fair (Blume et al., 2009; Latham, 2012).

The forced distribution performance appraisal is a method of performance appraisal developed to resolve the issues of leniency bias and centrality bias (Beenen, 2014; Guralnik, Rozmarin, & So, 2004; Grote, 2005). With the forced

distribution performance appraisal, supervisors classify employees as high, medium, and low performers. Supervisors evaluate subordinates by comparing their performance amongst each other and sorting them into predetermined performance categories (Dominick, 2009) provided by the company (Guralnik et al. 2004). For example, the forced distribution at a company may be applied with a 20/70/10 system, where 20% of employees are rated as the best performers, while 70% are average, and 10% as the worst performers (Steward, Gruys, & Storm, 2010).

Researchers have studied the pros and cons of the forced distribution approach (Moon, Scullen, & Latham, 2016; Wijayanti, Sholihin, Nahartyo, & Supriyadi, 2022). Forced rankings may improve employee motivation and performance as well as attract high performing applicants to the organization (Blume et al, 2009). Conversely, forced rankings can lead to decreased job satisfaction and extreme competitiveness as employees try to score high or avoid falling at the bottom of the distribution (Chattopadhayay, & Ghosh, 2012). Regardless of the pros and cons of the forced distribution appraisal, many companies continue to use a form of the forced distribution appraisal for evaluating the performance of their employees (Long, 2021; Chattopadhyay, 2019; Faragher, 2021).

The objectives of the experiential activity described in this paper are for students to experience and develop the skills needed to conduct a forced distribution performance evaluation and become aware of the biases inherent in this type of system.

PROCEDURE FOR IMPLEMENTING FORCED DISTRIBUTION ACTIVITY IN CLASS

Part 1- Group Phase

1. The instructor introduces the concept of forced distribution performance appraisals and reviews the instructions on *Handout 1.*
2. Assign students to one of six groups. This activity works best with three students per group, but larger groups can be used at the discretion of the instructor.
3. Provide each group with the Distribution Score Sheet (*Handout 3*) and the unique version of *Handout 2* associated with each group. *Handout 2* has general descriptions of 30 different employees, but each group is provided additional information about six employees—the ones they manage.
4. Each group is instructed to fill in the Distribution Score Sheet (*Handout 3*) using their employee descriptions.

Part 2- Consensus Meeting

Once all groups have completed filling out their Distribution Score Sheet (*Handout 3*), a blank Distribution Score Sheet is displayed by the instructor. The instructor informs the class that they will be completing the blank Distribution Score Sheet as a class by reaching consensus. The structure of filling out the class-wide distribution is as follows for each of the 30 employees:

Procedure	**Example**
Each group provides their rating of an employee. If all groups have the same rating, consensus has been reached, and that employee number is added to the distribution.	Instructor asks each of the six groups to provide ratings for employee 25. The ratings are as follows: 2, 3, 2, 3, 2, 2.
If there are any discrepancies in ratings, the manager of that employee (e.g. group 1 manages employee 1) describes the employee to the other groups.	Group 1 tells other groups about employee's hard work, cutting corners, and safety violations (based on the description provided in Handout 2).

Each group discusses whether the new information impacts their rating.	All groups discuss the information presented by Group 1 to decide if they should change their own rating of employee 25.
Groups again provide their *new* rating, and again, if consensus is reached, the employee is added to the distribution.	Instructor again asks groups to provide ratings for employee 25. This time, all but Group 4 give employee 25 a score of 2.
If there remains no consensus, any student may raise their hand to justify and explain their rating.	Individuals from various groups justify their ratings and try to reach consensus through group discussion. Ultimately, consensus for a score of 2 is reached.

Part 3- Debrief

Once the entire Distribution Score Sheet (*Handout 3*) is completed, the instructor presents debriefing questions:

1. What strategies did your group use to fill out your own distribution?
2. What would have made reaching consensus easier?
3. What advice would you give to human resource professionals who are responsible for performance appraisals?

During the discussion, the instructor should emphasize the following:

- Performance appraisals will always rely on incomplete information. We cannot observe all employee behavior.
- In any workplace, individuals will have varied perceptions about employee behavior and performance.
- When criteria are clearer and objective, raters are more likely to arrive at similar conclusions to one another.

Activity Handouts

Handout 1 – Forced Distribution Activity Instructions

- 30 employees of the same position need to be placed into a forced distribution on a 1-5 scale. These numerical ratings determine raises, promotions, and likelihood of being fired.
  - 10% receive 1's (3 employees)
  - 20% receive 2's (6 employees)
  - 40% receive 3's (12 employees)
  - 20% receive 4's (6 employees)
  - 10% receive 5's (3 employees)
  - The job is a warehouse position in which most of the work is individually based and relies on successful use of equipment such as forklifts. Occasionally employees work together to complete their work. In these instances, interpersonal skills are vital. Punctuality and adherence to safety protocols are also stressed within evaluation of employees. Safety violations are significant and uncommon.
- Each group is the manager of 5 employees and has *some* knowledge of the other 25 employees.
- Your task:
  - *1.* Within your group, place all 30 employees within the forced distribution (*Handout 3*)
  - 2. As a class, discuss your ratings and agree on a final rating for each employee

Handout 2 - Group 1 Description of Employees

1. You manage employee 1. He is typically punctual and is very strong with the use of equipment. He is not terrible at communicating but seems to prefer following directions rather than working with others.
2. Employee 2 works well with your staff and seems pretty strong with the equipment.
3. You know that employee 3 is new…but my goodness is he awful with the equipment. Your employees tell you he's easy to work with.
4. Employee 4 keeps to himself. He seems to be one of the strongest workers in this position, but your employees have never worked with him.
5. Your employees tell you that he is awful to work with, but he seems to be strong with the equipment. You have seen him show up late once or twice.
6. She seems strong with the equipment and works safely. Your workers do not have strong opinions about her.
7. You manage employee 7. He falls pretty much in the middle of the pack in all regards. He shows up on time, works hard, and gets along with others, but is not especially efficient with the equipment.
8. She seems really strong with both equipment and working with others. You have seen her taking leadership roles when working with your employees and they all tell you that she would make a great manager.
9. He seems to work quite well with others and is definitely strong with equipment.
10. She confuses you…sometimes she seems really efficient and strong and other times she seems to be working incredibly slowly an inefficiently.
11. She seems really poor with the equipment. She is very friendly, and people seem to like her, but her speed and use of the equipment are not great.
12. You always see her just standing around. The rare times that she is working, it seems like she is very very strong with the equipment and works safely.
13. You manage employee 13. He is known throughout the warehouse as the best employee in this position. Coworkers often go to him with questions rather than managers because he is so skilled with the equipment and is excellent at communicating the information to others. Punctuality and safety have not been an issue.
14. He seems to be incredibly strong with the equipment. Occasionally you see him chit-chatting with coworkers instead of working, but he generally seems to be doing strong work. Your employees enjoy working with him.
15. Every time you see her it seems like she is doing something incredibly unsafe.
16. He has been with the company for years but is just awful with the equipment… Your employees tell you he is good at working with others.
17. He is not as fast as others, and frankly not as good with the equipment, but he is always pitching in and helping out your workers. He also seems willing to do whatever is asked of him without complaints.
18. He got in a fist fight at work a few months ago. You thought he should have been fired, but since then he seems to get along with his coworkers and he does work well with the equipment. However, You have seen him loudly complaining about management on multiple occasions.
19. You manage employee 19. Throughout 95% of the past year, he has been incredibly strong with the equipment and his interpersonal skills have been great. Within the last month he has become completely quiet and has made several mistakes that almost earned safety violations. He continues to show up on time and works hard.
20. She seems terrible at both handling the equipment and working with others.
21. He is one of the best in the warehouse at handling the equipment. Your employees all tell you that he would make a great leader.
22. He never seems to be doing any work…Every time you see him, he is just chatting with others, so you really do not know how strong he is with the equipment or interpersonally.
23. You always thought she was good at her job and friendly with others, and she seemed good with the equipment, but earlier this year she got a safety violation. You are not sure if she is less safe when managers are not around.
24. He will not stop talking about how much he hates everything about the company. You do not even know if he is good at the job because all you ever see him doing is complaining, even while working.
25. You manage employee 25. He works hard and is strong with the equipment. However, he cuts corners and has cost the company a lot of money because of multiple safety violations which resulted in damaged product. His coworkers all seem to enjoy working with him.
26. He seems good with the equipment. Your employees have not had anything particularly positive or negative to say about working with him.
27. She seems nothing but pleasant and your employees tell you she is good to work with. She does not seem to be very strong with the equipment.

28. He seems to be absolutely amazing with the use of equipment. You do not know if there is anyone in the warehouse who is more efficient with the equipment. Your employees have not told you anything about him.
29. You do not see him very often, but when you do, he seems to be very good with the equipment and at working with others.
30. She is a little slow with the equipment, but she is incredibly friendly and well-liked by just about all of the employees, and never has any safety concerns.

Handout 2a - Group 2 Description of Employees

1. Employee 1 seems to be strong with the equipment, but your employees have said he's not very fun to work with.
2. You manage employee 2. She is often late to work but when she arrives, she works well with others and is reasonably skilled with the equipment. She was cited for one safety violation in this past year, and these violations are relatively uncommon.
3. You know that employee 3 is new…but my goodness is he awful with the equipment. Your employees tell you he's easy to work with.
4. Employee 4 keeps to himself. He seems to be one of the strongest workers in this position, but your employees have never worked with him.
5. Your employees tell you that he is awful to work with, but he seems to be strong with the equipment. You have seen him show up late once or twice.
6. She seems strong with the equipment and works safely. Your workers do not have strong opinions about her.
7. Mediocrity at its finest.
8. You manage employee 8. She is by far your best employee. She consistently works well with the equipment, assumes leadership roles when grouped with others and takes direction without question. You have already tried to put her up for promotion, but she got passed up last time.
9. He seems to work quite well with others and is definitely strong with equipment.
10. Every time you see her, she is working really hard and seems really strong with the equipment.
11. She seems really poor with the equipment. She is very friendly, and people seem to like her, but her speed and use of the equipment are not great.
12. You always see her just standing around. The rare times that she is working, it seems like she is very very strong with the equipment and works safely.
13. He is the best employee in the entire position. Great in every facet of his job.
14. You manage employee 14. To be blunt, you have been looking for an excuse to fire him. He is late at least once a week, is often seen not working at all, and does not follow direction well at all. However, he is very skilled with the equipment, and you are concerned that others only see these behaviors.
15. Every time you see her it seems like she is doing something incredibly unsafe.
16. He has been with the company for years but is just awful with the equipment… Your employees tell you he is good at working with others.
17. He is not as fast as others, and frankly not as good with the equipment, but he is always pitching in and helping out your workers. He also seems willing to do whatever is asked of him without complaints.
18. He got in a fist fight at work a few months ago. You thought he should have been fired, but since then he seems to get along with his coworkers and he does work well with the equipment. However, You have seen him loudly complaining about management on multiple occasions.
19. He is seemingly proficient with the equipment and always works well with others.
20. You manage employee 20. She is not very strong with equipment nor interpersonal skills. She has been in the warehouse for several years and does not seem to be getting better at these facets of her job. However, she is always on time, avoids unsafe behaviors, and tries hard.
21. He is one of the best in the warehouse at handling the equipment. Your employees all tell you that he would make a great leader.
22. He never seems to be doing any work…Every time you see him, he is just chatting with others, so you really do not know how strong he is with the equipment or interpersonally.

23. You always thought she was good at her job and friendly with others, and she seemed good with the equipment, but earlier this year she got a safety violation. You are not sure if she is less safe when managers are not around.
24. He will not stop talking about how much he hates everything about the company. You do not even know if he is good at the job because all you ever see him doing is complaining, even while working.
25. Your employees keep telling you how great of a worker he is. All you really know about him is that he has broken thousands of dollars worth of products with misuse of the equipment.
26. You manage employee 26. He is reasonable strong with the equipment and has decent interpersonal skills. He has been late a couple of times in the past year, but nothing warranting a written warning.
27. You have never seen her using the equipment, but she is incredibly personable and seems to work really hard and well with others.
28. He seems to be absolutely amazing with the use of equipment. You do not know if there is anyone in the warehouse who is more efficient with the equipment. Your employees have not told you anything about him.
29. You do not see him very often, but when you do, he seems to be very good with the equipment and at working with others.
30. She is a little slow with the equipment, but she is incredibly friendly and well-liked by just about all of the employees, and never has any safety concerns.

Handout 2b - Group 3 Description of Employees

1. Employee 1 seems to be strong with the equipment, but your employees have said he is not very fun to work with.
2. Employee 2 works well with your staff and seems pretty strong with the equipment.
3. You manage employee 3. He is a very new employee but seems to be learning quickly. His equipment skills are still lacking, but you assume he will continue to progress. He is always punctual and works well with others.
4. Employee 4 keeps to himself. He seems to be one of the strongest workers in this position, but your employees have never worked with him.
5. Your employees tell you that he is awful to work with, but he seems to be strong with the equipment. You have seen him show up late once or twice.
6. She seems strong with the equipment and works safely. Your workers do not have strong opinions about her.
7. Mediocrity at its finest.
8. She seems really strong with both equipment and working with others. You have seen her taking leadership roles when working with your employees and they all tell you that she would make a great manager.
9. You manage employee 9. He works very well with others and is quite capable with the equipment. He has shown up to work late on more than one occasion and has been written-up because of it.
10. It seems like every time you see her, she is working really slowly, almost intentionally so. She seems proficient enough with the equipment.
11. She seems really poor with the equipment. She is very friendly, and people seem to like her, but her speed and use of the equipment are not great.
12. You always see her just standing around. The rare times that she is working, it seems like she is very very strong with the equipment and works safely.
13. He is the best employee in the entire position. Great in every facet of his job.
14. He seems to be incredibly strong with the equipment. Occasionally you see him chit-chatting with coworkers instead of working, but he generally seems to be doing strong work. Your employees enjoy working with him.
15. You manage employee 15. She is excellent with the equipment and works well with others. Her punctuality has not been an issue, but she has incurred 2 safety violations in the past year (one violation is uncommon). You are unsure if she is less careful when you are not around.
16. He has been with the company for years but is just awful with the equipment… Your employees tell you he is good at working with others.

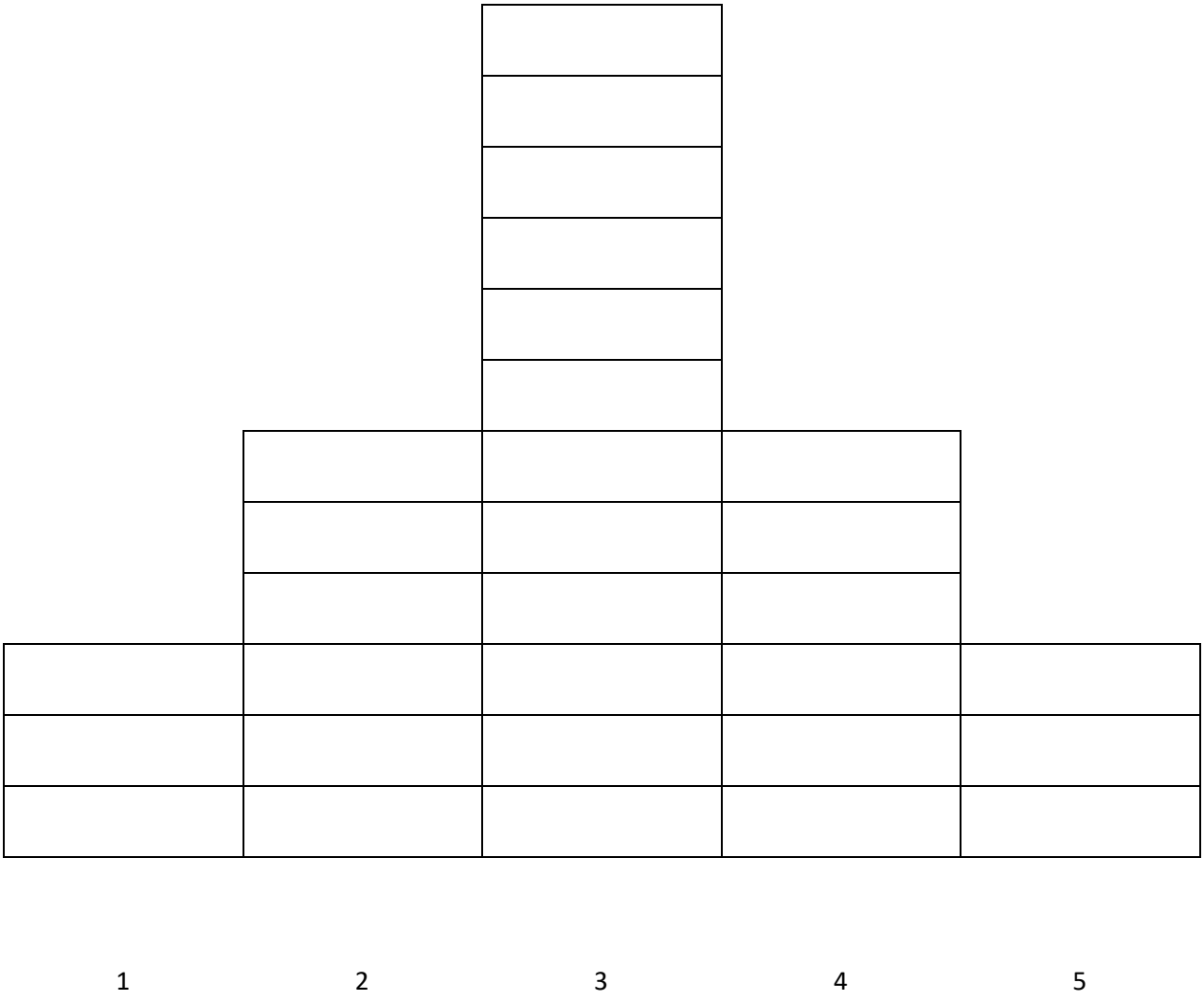
17. He is not as fast as others, and frankly not as good with the equipment, but he is always pitching in and helping out your workers. He also seems willing to do whatever is asked of him without complaints.
18. He got in a fist fight at work a few months ago. You thought he should have been fired, but since then he seems to get along with his coworkers and he does work well with the equipment. However, You have seen him loudly complaining about management on multiple occasions.
19. He is seemingly proficient with the equipment and always works well with others.
20. She seems terrible at both handling the equipment and working with others.
21. You manage employee 21. He really does not seem to like you at all, and you have no idea why. He responds poorly to your direction and generally says something snarky before following the direction. He is incredibly skilled with the equipment and has strong personal skills with his coworkers. He is always on-time and has not been issues any safety violations.
22. When he is working, he seems really strong both with the equipment and interpersonally. However, you have seen him slacking off and chatting with others from time to time.
23. You always thought she was good at her job and friendly with others, and she seemed good with the equipment, but earlier this year she got a safety violation. You are not sure if she is less safe when managers are not around.
24. He will not stop talking about how much he hates everything about the company. You do not even know if he is good at the job because all you ever see him doing is complaining, even while working.
25. Your employees keep telling you how great of a worker he is. All you really know about him is that he has broken thousands of dollars worth of products with misuse of the equipment.
26. He seems good with the equipment. Your employees have not had anything particularly positive or negative to say about working with him.
27. You manage employee 27. She works incredibly hard and is strong with interpersonal skills. She is *terrible* with the equipment, and you have had to prevent her from committing safety violations around five times within the past year. She is extremely punctual.
28. He seems to be absolutely amazing with the use of equipment. You do not know if there is anyone in the warehouse who is more efficient with the equipment. Your employees have not told you anything about him.
29. You do not see him very often, but when you do, he seems to be very good with the equipment and at working with others.
30. She is a little slow with the equipment, but she is incredibly friendly and well-liked by just about all of the employees, and never has any safety concerns.

Handout 2c - Group 4 Description of Employees

1. Employee 1 seems to be strong with the equipment, but your employees have said he is not very fun to work with.
2. Employee 2 works well with your staff and seems pretty strong with the equipment.
3. You know that employee 3 is new…but my goodness is he awful with the equipment. Your employees tell you he is easy to work with.
4. You manage employee 4. He does NOT get along well with coworkers or you, but when left to his own devices, is extraordinarily efficient and incredibly strong at handling the equipment. He is typically punctual but occasionally shows up late.
5. Your employees tell you that he is awful to work with, but he seems to be strong with the equipment. You have seen him show up late once or twice.
6. She seems strong with the equipment and works safely. Your workers do not have strong opinions about her.
7. Mediocrity at its finest.
8. She seems really strong with both equipment and working with others. You have seen her taking leadership roles when working with your employees and they all tell you that she would make a great manager.
9. He seems to work quite well with others and is definitely strong with equipment.
10. You manage employee 10. She has been working at the warehouse for over 30 years and is very rhythm oriented. When given the tasks she prefers, she is quick and efficient. If given fewer desirable tasks, she seems to intentionally work slower. Punctuality and safety have never been an issue for her.

11. She seems really poor with the equipment. She is very friendly, and people seem to like her, but her speed and use of the equipment are not great.
12. You always see her just standing around. The rare times that she is working, it seems like she is very very strong with the equipment and works safely.
13. He is the best employee in the entire position. Great in every facet of his job.
14. He seems to be incredibly strong with the equipment. Occasionally you see him chit-chatting with coworkers instead of working, but he generally seems to be doing strong work. Your employees enjoy working with him.
15. She seems pretty efficient and strong with the equipment. Your employees like her, but it seems like she is working a little too quickly at times.
16. You manage employee 16. He is really not good working with the equipment, but when he works with others who *do* handle the equipment well, he is very good at being personable and working with others. All of his coworkers mention how nice he is. He is always on-time and very safe.
17. He is not as fast as others, and frankly not as good with the equipment, but he is always pitching in and helping out your workers. He also seems willing to do whatever is asked of him without complaints.
18. He got in a fist fight at work a few months ago. You thought he should have been fired, but since then he seems to get along with his coworkers and he does work well with the equipment. However, You have seen him loudly complaining about management on multiple occasions.
19. He is seemingly proficient with the equipment and always works well with others.
20. She seems terrible at both handling the equipment and working with others.
21. He is one of the best in the warehouse at handling the equipment. Your employees all tell you that he would make a great leader.
22. You manage employee 22. He is reasonably strong with the equipment but needs to be reminded to stay on task. At times, his efficiency is poor because he is too busy chatting with coworkers. He is always on-time and does not have any safety violations.
23. You always thought she was good at her job and friendly with others, and she seemed good with the equipment, but earlier this year she got a safety violation. You are not sure if she is less safe when managers are not around.
24. He will not stop talking about how much he hates everything about the company. You do not even know if he is good at the job because all you ever see him doing is complaining, even while working.
25. Your employees keep telling you how great of a worker he is. All you really know about him is that he has broken thousands of dollars worth of products with misuse of the equipment.
26. He seems good with the equipment. Your employees have not had anything particularly positive or negative to say about working with him.
27. You would fire her immediately if given the opportunity. She almost destroyed thousands of dollars worth of products and nearly ran over the foot of your employee with a forklift.
28. You manage employee 28. He is very strong with the equipment and is one of the most efficient employees in this position. He is your last option when it comes to having people work together because others have told you that he is incredibly rude. However, you have not paired him with anyone at all in the past year, so you really have no way of evaluating his teamwork.
29. You do not see him very often, but when you do, he seems to be very good with the equipment and at working with others.
30. She is a little slow with the equipment, but she is incredibly friendly and well-liked by just about all of the employees, and never has any safety concerns.

Handout 3 – Distribution Score Sheet



1 2 3 4 5

CONCLUSION

The activity discussed in this paper serves a number of purposes in student development of knowledge and skills. First, although forced distributions are just one of many performance appraisal systems used by organizations, it is important for students to learn how they will be evaluated if they work for companies that utilize a forced distribution, and more generally, how normative scoring works. Of greater importance, through this activity students learn that performance appraisals rely on only what is known about employee behavior, and that other raters may have varied knowledge and perceptions of employee performance. Further, the activity teaches students the importance of clear, objective performance criteria to create a shared understanding of performance expectations among raters. More broadly, the present activity encourages critical thinking while navigating through ambiguity, teamwork within individual groups, and compromise with others.

Performance appraisal is a fundamental process for most companies, and the number of ways organizations choose to evaluate employee performance is seemingly ever-increasing. The activity presented in this paper focuses on just

one performance management system, but skills learned such as wading through ambiguity, defining, and operationalizing criteria, and collaboration/compromise will have universal application.

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Joseph Westlin is an Assistant Professor of Management at Minnesota State University, Mankato. Dr. Westlin has a Ph.D. from the University of Oklahoma. His current research interests include training and development, employment interviews, leadership and performance management. Dr. Westlin teaches undergraduate and graduate course in human resource management, staffing, and organizational behavior.

Kathleen M. Dale is a Professor of Management and the Interim Associate Dean of the College of Business at Minnesota State University, Mankato. Dr. Dale has a Ph.D. from the University of North Texas. Her areas of expertise include Organizational Theory and Business Policy and she teaches graduate and undergraduate classes in these areas. Her current research interests include small business management, the use of business simulations, environmental management, and leadership. Dr. Dale has served on the Board of Directors for a number of small business enterprises.

Beyond the Business Model Canvas: Business and Stakeholder Model Visualization and Audit.

Dekuwmini Mornah, Northern Kentucky University, USA.

ABSTRACT

This paper presents the "Business and Stakeholder Model Visualization and Audit" an educational activity that extends the traditional Business Model Canvas (BMC) to include stakeholder interactions and value dynamics. It guides students through stakeholder identification, value mapping, and sustainability analysis, enabling them to visualize the relationships between a business and its external stakeholders. By analyzing value creation, capture, and associated costs, students can assess the sustainability of a business and its partnerships model. This approach fosters a comprehensive understanding of business models, emphasizing the importance of sustainable stakeholder engagement for long-term viability. The paper provides a framework for integrating this activity into business education to develop innovative and sustainable business models. An illustrative example demonstrates the application of this approach.

Keywords: Business Model Canvas (BMC), Stakeholder Engagement Visualization, Sustainability Analysis, Value Creation and Capture

INTRODUCTION

In the ever-evolving landscape of business education, it is imperative to equip students with tools and frameworks that not only enhance their understanding of business models but also enable them to critically analyze the sustainability and viability of these models (Teece, 2010). One such foundational tool is the Business Model Canvas (BMC) - a widely used strategic tool for visualizing and articulating the core elements of a business model. Developed by Alexander Osterwalder and Yves Pigneur, the canvas provides a structured approach to describing how a company creates, delivers, and captures value (Osterwalder & Pigneur, 2010). The canvas consists of nine building blocks: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure. Its ease of use and focus on key components make it popular in entrepreneurship education, sustainability analyses and business model innovations (Joyce & Paquin, 2016).

While the BMC outlines essential partners, it doesn't explicitly dissect the complex interactions between these stakeholders with the business, customers and other partners or illuminate the nature of value creation, value capture, and relative costs for all parties involved (Zott & Amit, 2010). Understanding these value dynamics is crucial for designing a sustainable business model (Board of Innovation). A model where certain stakeholders capture more value than they create, or where the cost of creating value exceeds the value captured, can lead to "leaks" and eventual breakdown (Bocken et al., 2014). To ensure the sustainability of a business model, it is important to analyze these interactions and ensure that for all stakeholders, the value created is greater than the value captured, and the value captured is greater than the cost of creating that value (Breuer & Lüdeke-Freund, 2017).

This paper describes an activity I implement in my Idea Validation class (junior standing) which extends Board of Innovation Business Model kit to expand upon the traditional BMC by incorporating a more detailed analysis of the interactions between stakeholders, focusing on how they create and capture value. This advanced analysis designed to provide students with a deeper understanding of the quantitative relationships between value creation, value capture, and the cost of creating value. The model doesn't analyze the internal workings of the business. It examines how external stakeholders and partners interact with the business, its customers and with each other to ensure sustainable delivery of the promised value to customers. Students can assess sustainability by auditing these interactions to evaluate if each stakeholder is abiding by the rule that they create more value than captured and capture more value than it costs them to create.

This assignment aims to foster a critical and nuanced understanding of business models that goes beyond the standard BMC representation. It fosters a holistic understanding of business models among students, enabling them to not only conceptualize the various components of a business model but also critically evaluate its robustness and sustainability. By integrating the analysis of stakeholder interactions and value dynamics into the BMC framework, students will be better equipped with the critical skills to develop and assess business models that are not only innovative but also sustainable in the long run as well as identify weaknesses for improvement (Chesbrough, 2010).

PRE-ACTIVITY COURSE WORK AND LECTURE

Prior to the Business and Stakeholder Model Visualization activity, students would have completed several essential steps in validating their business ideas. They would have validated their problems, generated and validated solution concepts, and filled in the business model canvas with key external stakeholders such as partners and customers clearly identified. During the class lecture, the importance of these identified stakeholders for the success of the business is discussed.

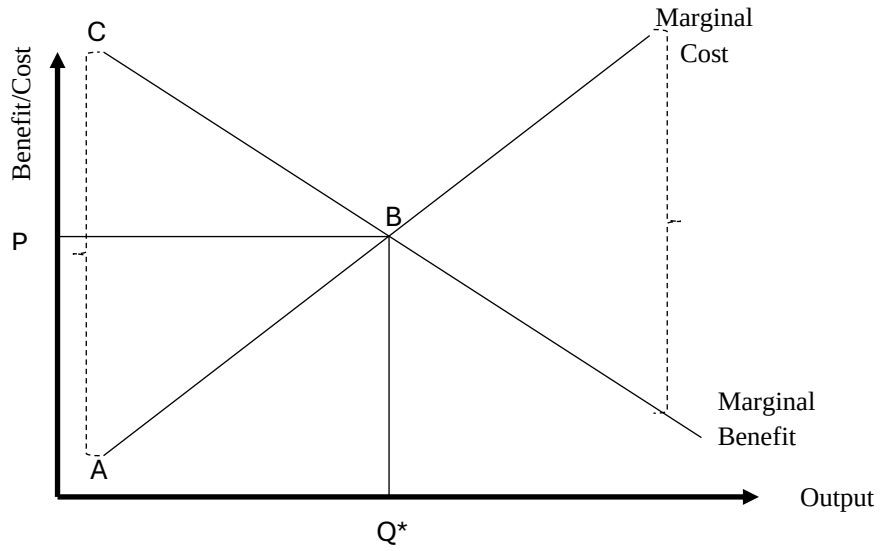
Students usually have a good understanding of why these stakeholders are crucial for their business. However, when asked why those stakeholders would choose to engage with them instead of others, students often struggle to provide a well-thought-out answer. This is where the lecture delves deeper into the concept of stakeholder engagement and value creation.

The lecture begins with a crucial principle: partners will only engage with a business if doing so offers them greater value than any other alternative use of their time and resources. This fundamental idea lays the groundwork for lasting, mutually beneficial partnerships. To ensure this principle holds for all stakeholders, two key guidelines must apply:

1. Net Value Creation: Each stakeholder must consistently generate more value for the overall business model than the value they capture for themselves.
2. Value Capture Exceeds Cost: Each stakeholder must capture enough value to justify the costs (money, time, resources) they invest in creating that value.

To illustrate these principles, the lecture introduces a supply and demand framework (Figure 1). Within this framework, we visualize the stakeholder's interaction with our business model. A simplified supply curve represents the increasing cost they incur as they provide more services or output. The demand curve represents the decreasing marginal value their participation creates for the business model.

Figure 1: Stakeholder value-creation-capture-cost analysis



It's important to emphasize that 'benefit' and 'cost' extend beyond purely financial. Benefits can include reputation, exposure, and other intangible benefits, while costs encompass the opportunity cost of time, resources, and even goodwill. The 'equilibrium output' is the point where the benefit the stakeholder captures aligns with both their marginal cost curve and the decreasing marginal benefit curve. This equilibrium reflects a balance where the stakeholder's contribution to the business model is sustainable and aligned with the value they capture and the costs they incur.

The sustainability of the stakeholder's engagement with the business model can be assessed by examining the area between the marginal cost curve and the marginal benefit curve before the equilibrium point, as illustrated in Figure 1. In the region labeled as area ABC, which lies to the left of the equilibrium point, the value created by the stakeholder (marginal benefit curve) exceeds both their cost of participation (marginal cost curve) and the value they capture (equilibrium price). This relationship indicates a mutually beneficial arrangement, where the stakeholder's contribution generates more value for the business model than it costs them to provide, while also allowing them to capture sufficient value to justify their continued engagement. A positive gap between value created and costs incurred suggests stakeholder participation is sustainable within this output range. It signifies that the business model is deriving a net benefit from the partnership, and the stakeholder is adequately incentivized to maintain their involvement.

However, as we move beyond the equilibrium point, the dynamics of sustainability shift. In the region to the right of the equilibrium, the value created by the stakeholder falls below both their marginal cost curve and the value they capture. This reversal of the relationship indicates that the stakeholder's engagement becomes unsustainable at higher levels of output or involvement. When the stakeholder's costs exceed the value they create for the business model, and the value they capture is insufficient to compensate for these costs, their participation becomes economically unviable. This situation may lead to the stakeholder disengaging from the partnership or requiring a renegotiation of the terms to restore sustainability.

By analyzing the area between the cost curve and the value curve, students can identify the range of output or engagement where the stakeholder's participation is sustainable. This visual representation helps them understand the importance of operating within the sustainable region, where value creation outweighs costs, and stakeholders are adequately rewarded for their contributions.

Furthermore, this analysis prompts students to consider strategies for extending the sustainable range or shifting the equilibrium point to accommodate growth and long-term viability. It encourages them to proactively identify potential challenges and develop strategies to ensure the ongoing engagement and satisfaction of key stakeholders. By optimizing processes, reducing costs, or enhancing value creation, businesses can expand the region of sustainability and create more room for successful stakeholder collaboration.

ASSIGNMENT DESIGN

Objectives:

The purpose of this assignment is to guide students in creating comprehensive business models that take into account stakeholder engagement, the value they create and receive, and the dynamics of their interactions within the business model. Specifically, it helps students:

- Think Beyond the BMC: Students understand that the Business Model Canvas, while valuable, doesn't fully capture external partner dynamics and value flow.
- Value Asymmetry: Students learn that sustainable business models rely on partners creating more value than they capture and capturing more value than their costs of participation.
- Identify relevant Stakeholder: Students learn to identify ALL relevant stakeholders influencing or influenced by the business, not just those directly involved in transactions.
- Map Interactions: Students visualize complex stakeholder relationships, showing how they interact with the business and with each other.

- Analyze Value Flows: Students dissect the value proposition for each stakeholder, the value they generate for the model, and their costs of participation.
- Perform Sustainability Audit: Students learn to identify potential "freeloaders" or disincentivized stakeholders and suggest model adjustments to ensure win-wins.
- Optimize Processes: Students can use visualization to identify bottlenecks or redundancies in the stakeholder ecosystem, suggesting streamlining opportunities.
- Consider Ethics in Business: Students may reflect on ensuring a fair distribution of value among stakeholders, beyond purely economic motivations.

Assignment Tasks:

1. Prerequisites: Ensure students have completed problem validation, ideation, solution validation, and a draft Business Model Canvas (BMC). This provides the foundation for stakeholder analysis.

2. Stakeholder Identification: Guide students through a methodical process to identify relevant stakeholders:
   a. Start with BMC: Review the Key Partners, Customer Segments, and Value Propositions on their BMC.
   b. Expand Outwards: Ask "Who else, beyond these core partners, is essential for delivering each value proposition element?" (e.g., suppliers, regulators, communities)
   c. Consider Impact: "Who is significantly affected by this business, even if not a direct partner?"

3. Value Mapping:
   a. Instruct students to use a specific visualization tool (flowchart, network map, etc.) or provide a choice of recommended ones. I use simple flow charts.
   b. Emphasize that the map must show:
      - Stakeholders as nodes
      - Interactions as connections, with clear directionality
      - Value flows (financial, reputational, etc.) labeled on connections.

4. Written Explanation: In addition to the visual map, require students to write a clear narrative explaining how the model works:
   a. Start from the node representing their business, explain the logic of how the model works, outlining the key interactions and value exchanges with each stakeholder group.
   b. Explain how each stakeholder contributes value to the business and what value they capture in return.
   c. Briefly describe how the model delivers the promised value proposition to customers, highlighting the roles of key stakeholders in this process.

5. Sustainability and Efficiency Audit:
   a. Provide a blank Table 1 with columns for Stakeholder | Value Created | Value Captured | Costs.
   b. Sustainability Criteria: Explicitly state:
      - For EACH stakeholder students ensure that: Value Created > Value Captured > Cost
      - If the above isn't true, flag the stakeholder for further considerations.
   c. Direct students to propose solutions when imbalances exist, focusing on increasing stakeholder value rather than just deletion.
   d. Efficiency: Ask students to suggest optimizations based on their visualization (can processes be streamlined, redundant interactions reduced, etc.).

ILLUSTRATIVE EXAMPLE

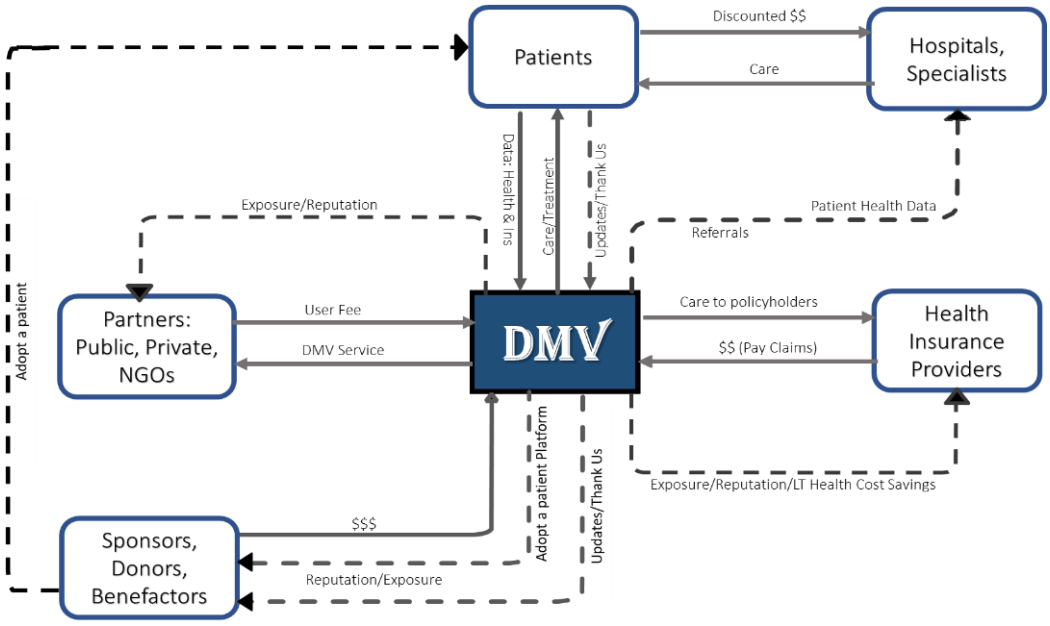
1. Prerequisites

- *Problem Validation:* Students have through needs assessments, interviews confirmed the following problem: There is inadequate access to quality healthcare services for rural dwellers in Ghana, which leads to poor health outcomes, unmet medical needs, and a lower quality of life.
- *Ideation & Solution Validation:* They explored solutions (telehealth, fixed clinics, etc.), and determined that the best solution is mobile health units equipped with essential medical equipment, supplies, and facilities to provide primary care, vaccinations, maternal and child health services, and other basic healthcare services.
- *BMC:* Students complete a Business Model Canvas. We focus on these relevant portions for this illustration:
  - Customer Segments: Rural dwellers
  - Value proposition: DMV delivers quality primary care and essential health services directly to rural Ghanaian communities within 24 hours of scheduled visits. Our mobile clinics offer affordable, transparent pricing and eliminate the need for long, costly travel.
  - Value Proposition Delivery: DMV's mobile health units travel to rural communities on a regular schedule, equipped with necessary resources and qualified personnel to provide defined healthcare services.
  - Key Partners: Health insurance providers, NGOs, public and private organizations, and donors/sponsors.

2. Stakeholder Identification

- Key Partners in BMC: Students examine "Key Partners" and "Customer Segments" from their BMC and find: Health insurance providers, NGOs, public and private organizations and donors/sponsors and patients
- Beyond the Obvious: They ask:
  - To deliver the value proposition, who else is needed? (Hospitals, clinics, and specialists for continuity of care; Pharmacies for meds, telecom for connectivity, local leaders for community buy-in; Government and regulatory bodies for compliance and support)
  - Who is impacted? (Families of patients, the healthcare system at large)

Figure 2: DMV Business and Stakeholder Model Visualization



3. **Stakeholder and Value Mapping**
   - **Tool:** In Figure 2, students use flowcharts to represent these interactions with DMV as the central node.
   - **Reading the model:** DMV is represented with a square rectangle, partners/stakeholders are represented by rounded rectangles, values created or received follow arrows labeled with value elements such as financial flows, improved health outcomes (flowing to patients), reputation (to NGOs, donors), exposure.

4. **Written explanation of how the model works.**
   - **Model Logic:** DMV delivers healthcare services to rural communities. Patients access services and pay via insurance. DMV bills insurance providers and rents services to organizations. Donations support operations. Referrals are made for advanced care.
   - **Stakeholder VP:**
     - Patients: Receive quality and affordable healthcare services.
     - Health insurance providers: Expand network, improve health outcomes, reduce costs, gain publicity and reputation.
     - Organizations: Fulfill mission, enhance CSR, support health and well-being.
     - Donors and sponsors: Make meaningful impact, create lasting change, improve reputation.
     - Hospitals, clinics, specialists: Receive patient referrals, provide continuity of care.

5. **Sustainability & Efficiency Audit**
   - Table 1: Students list stakeholders like Patients, Insurers, NGOs, Donors, Hospitals, Staff... then fill in Value Created, Captured, Costs for each as shown in the value flows in Figure 1.

Table 1: DMV Stakeholder Sustainability Audit

Stakeholder (List relevant stakeholders)	**∑(Values Created)** (Identify all values created your model by this stakeholder)	**∑(Values Captured)** (Identify all the ways stakeholder captures value in your model	**∑(Costs)** (Identify all costs this stakeholder incurs to deliver you value)	**Decision** (Determine if the value > Capture > Cost is met)
1. Patients	Quality healthcare	Improved health	Insurance premiums	Most likely -
2. Health Insurance	Expanded network, reduced costs	Publicity, reputation, premiums	Payments to DMV	Not likely (adverse selection)
3. Organizations (Private and Public)	Mission fulfillment, CSR	Reputation, exposure	User fees	Likely provided it's within their mission.
4. Donors/Sponsors	Social impact	Reputation, fulfillment	Financial, material contributions	Likely provided it's within their mission.
5. Hospitals/Clinics	Continuity of care	Patient referrals, service fees	Discounted prices (Treatment cost)	Likely

   - Audit:
     - Is Value Created consistently exceeding both Value Captured AND Costs for each stakeholder?
       - Imbalance. Although patients receive more value than cost, insurers might be reluctant to participate. This is because most villagers lack insurance, and those likely to sign up are those with medical needs, leading to insurers paying out more in claims than they receive in premiums.
     - Solution: To increase value for health insurance providers and encourage their partnership, the following were suggested:
       - Tiered Services: DMV works with insurance providers to offer plans with varying coverage levels to balance risk.
       - Risk Pooling: Promote broader insurance enrollment to diversify risk.
       - Preventive Care: Incorporate preventive services to reduce future treatment costs.
       - Subsidized Premiums: Seek and utilize government subsidies to make insurance more affordable.
       - Graduated Benefits: A scheme where basic benefits start immediately, and more comprehensive coverage kicks in after a certain period.

ASSESSMENT AND EVALUATION

To assess the effectiveness of the activity, I use formative assessment techniques that include in-class presentations, discussions and peer-to-peer feedback, and instructor guidance during the presentations. This proved very effective and saved time with grading. However, instructors can also use summative assessment such as grading the final stakeholder visualization and written analysis on completeness, accuracy, and depth of the analysis.

CHALLENGES AND LIMITATIONS

One of the main challenges encountered during the implementation of this activity was guiding students to effectively visualize the complex network of stakeholder interactions. Translating their understanding of these relationships into a clear, cohesive visual representation proved to be the most demanding aspect of the activity. To address this challenge, I found that providing students with multiple examples of well-constructed stakeholder visualizations greatly facilitated their learning process. By offering a range of samples, students were able to observe different approaches and techniques, which they could then adapt and apply to their own work. For instructors interested in incorporating this activity into their courses, I have compiled a collection of additional examples that showcase various styles and levels of complexity. These examples can serve as valuable resources to guide students through the visualization process and inspire them to create effective, insightful representations of stakeholder interactions within business models.

STUDENT FEEDBACK

Student feedback, gathered during an in-class discussion, has been overwhelmingly positive. Many students found that the activity provided a more comprehensive understanding of business models and the crucial role of stakeholder engagement. The stakeholder visualization component was particularly eye-opening, revealing the intricate network of relationships and value exchanges that underpin a successful business. Students recognized the importance of ensuring sustainable value creation and capture for all stakeholders. Some students also noted that the activity encouraged them to delve deeper into key partnerships, going beyond mere identification to analyze their dynamics and contribution to the overall business model. Overall, the activity effectively bridged theory and practice, equipping students with valuable insights for creating sustainable, stakeholder-centric business models.

CONCLUSION

The "Business and Stakeholder Model Visualization and Audit" activity represents a valuable addition to business education pedagogy, bridging the gap between theoretical concepts and real-world stakeholder engagement and sustainability practices. By providing students with a comprehensive framework for analyzing stakeholder interactions and value dynamics, this activity equips them with the skills and mindset necessary to develop innovative and sustainable business models. As business education continues to evolve, incorporating such activities will be crucial in preparing future leaders who can navigate the complex landscape of stakeholder engagement and drive positive change.

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Bio

Dr. Dekuwmini Mornah is an Assistant Professor of Entrepreneurship at Northern Kentucky University. He holds a Ph.D. in Economics and a Post-Doctorate in International Business and Entrepreneurship. His research interests include the connections between migration, institutions, and entrepreneurial activity. Additionally, he investigates teaching and learning innovations designed to enhance student entrepreneurial competencies and skill development.

The Role of Psychological Resilience in Business Education

Jonathan Biggane, California State University, Fresno
Robert Steinbauer, Brock University

ABSTRACT
The concept of psychological resilience has garnered increasing attention in organizational contexts. The ability to adapt and thrive amidst uncertainty and adversity is not merely advantageous but has become imperative for organizational survival. Drawing upon a synthesis of research, scholarly discourse, and practical insights, we delve into the multifaceted realm of building resilient individuals and organizations within the realm of business education. By examining psychological resilience and common approaches to building it, we aim to provide a comprehensive understanding of the principles and practices essential to infuse scholarship on resilience into business education.

Keywords: Psychological Resilience, Cognitive Appraisal Theory, Adversity

INTRODUCTION

In the realm of business education, the concept of psychological resilience has often been overlooked, yet it has been shown to be predictive of important outcomes including academic achievement and overall well-being (Allen, McKenna, Dominey, 2013; Tonkin, Malinen, Naswall, & Kuntz, 2018). Upon graduation, many students are thrown into situations fraught with challenges, setbacks, and unforeseen obstacles. How individuals, teams, and organizations navigate these challenges can often determine their success or failure. Drawing from the burgeoning research on psychological resilience, we aim to shed light on the importance of resilience in the context of business education and provide insights into how it can be integrated into curriculum and pedagogy.

Most people can handle moderate exposure to stress, but when it becomes particularly intense, uncontrollable, chronic, and overwhelming, it can lead to deleterious outcomes. For individuals lacking in resilience, it's not unusual for an adverse event to cause burnout, depression, anxiety, and inflammatory, cardiovascular, or other medical illnesses. Even in the common case of dealing with a layoff, many individuals experience anxiety, depression, social disengagement, high blood pressure, and even heart disease (Cooper & Marshall, 1976; Barling & Kelloway, 1996). In fact, the National Institute for Occupational Safety and Health has reported that as much as 90% of illness and disease is stress-related, so understanding how to build resilience can be imperative when attempting to prepare students for the inevitable challenges they'll face at work.

Theodore Roosevelt once remarked, "Never throughout history has a man who lived a life of ease left a name worth remembering." This sentiment underscores the idea that adversity, rather than comfort, often breeds resilience. In fact, Seligman (2011) argues that adversity is an essential ingredient to building resilience. In his work with the U.S. Army, Seligman found that resilience is actually common. He also found that human reactions to stressful events resemble a bell curve, where a small percentage of people experience post-traumatic stress disorder (PTSD) and a similar percentage experience post traumatic growth (PTG) or a positive psychological change that individuals experience after overcoming a highly challenging and stressful life event. Even among those who initially experience PTSD, Seligman found that many can actually recover. Relatedly, Drs. Southwick and Charney found that, in some cases, individuals who grew the most from adversity were the ones who were initially most distressed by it. They stated that "for some survivors, in order to promote growth, a traumatic experience must cause enough distress to shake the individual's view of the world and his or her place in it" (2018, p. 193). As a result, they typically demonstrated greater personal strength, improved relationships, and a spiritual connection after going through trauma. Therefore, developing resilience in individuals isn't about avoiding adversity, but equipping them with the resources to overcome it and grow stronger.

In the following sections, we define resilience and distinguish it from similar and sometimes overlapping constructs. We'll then discuss the relevance or resilience to business education and go into common approaches to building it. In doing so, we delve into the research on psychological resilience, examining its multidimensional nature and the factors that contribute to its development. Moreover, we will discuss practical strategies for infusing resilience into business education curriculum and pedagogy, ensuring that students are equipped with the tools they need to succeed in the face of adversity.

PREVIOUS RESEARCH

The operationalization of resilience has evolved over time as we gain a better understanding of what it is and how it works. One of the most prolific resilience scholars, George Bonanno, originally defined it as the "ability of adults in otherwise normal circumstances who are exposed to an isolated and potentially highly disruptive event such as the death of a close relation or a violent or life-threatening situation to maintain relatively stable, healthy levels of psychological and physical functioning . . . as well as the capacity for generative experiences and positive emotions" (Bonanno, 2004; pp. 20–21). In his book Aging Well, Harvard psychologist George Vaillant stated that resilience is like "a twig with a fresh, green living core. When twisted out of shape, such a twig bends, but it does not break; instead, it springs back and continues growing." More recently, the American Psychological Association defined it as "the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of threat" (2014, para. 4). The APA definition conceptualizes resilience as a process, but it has also been considered as an outcome of adversity and a psychological trait that some people are born with (Cazan & Truța, 2015). All three of these perspectives have received support in the literature on stress and coping.

The reality is that resilience is a multi-faceted construct that is difficult, but not impossible to define and measure. Resilience varies across circumstances, meaning that individuals might be more resilient in one situation than another based on their protective factors and resources. For instance, an individual may have financial resources that can help insulate them from worsening economic conditions. This is certainly useful in many situations, but it may do little to help cope with the loss of a loved one. In other words, different protective resources or experiences foster resilience in ways that are more applicable in some situations than others. Resilience also changes as we age, with older individuals generally demonstrating greater resilience than their younger counterparts. Studies of twins have shown that it's partly heritable as well, with approximately 32-38% of stress response attributed to genetics (Southwick & Charney, 2018).

The most common way to measure resilience is using the Connor-Davidson Resilience Scale (Connor & Davidson, 2003). This 25-item self-report scale assesses several components of resilience, including the ability to adapt to change, cope with stress, stay focused and think clearly, not get discouraged in the face of adversity, and handle unpleasant feelings.

In alignment with current operationalizations of resilience, we define it as the ability to overcome adversity and return to pre-trauma levels of functioning or greater. We posit that infusing business education curriculum with effective methods to enhance resilience will help students to prepare for the inevitable vicissitudes of life after academia.

The Nomological Network of Resilience

Psychological resilience is often discussed within the framework of three similar constructs: hardiness, coping, and recovery. First, hardiness, is one of the most common terms associated with resilience, which consists of three dimensions: being committed to finding meaningful purpose in life, the belief that individuals can influence or exert control over their situation and outcomes, and the belief that they can learn and grow from both positive and negative life events (Bonanno, 2004). A business leader who encounters setbacks but remains committed to their vision, believes they can influence outcomes through strategic decisions, and sees challenges as opportunities for growth embodies the dimension of hardiness. For instance, they might face market downturns but persist in finding innovative solutions to adapt and thrive.

Second, coping refers to cognitive and behavioral strategies utilized to manage stressful events or negative psychological and physical outcomes. In a business context, coping strategies can include developing contingency plans for unexpected challenges, seeking mentorship or advice from experienced professionals during difficult times, or implementing mindfulness techniques to manage stress effectively. For instance, a manager coping with a sudden increase in workload might prioritize tasks, delegate responsibilities, and practice time-management techniques to maintain productivity and reduce stress.

Third, recovery is another similar construct that often gets conflated with resilience. Recovery is characterized by readily observable elevations in psychological symptoms that last for at least several months before gradually returning to baseline, pre-event levels. After experiencing trauma, normal functioning can temporarily give way to threshold or sub-threshold psychopathology (e.g., individuals might experience symptoms of depression). Although individuals generally recover from tragedy after a few months, it can take as long as one or two years to recover (Bonanno, 2004).

For instance, after being laid off from their job, an individual may initially experience heightened stress, anxiety, and feelings of uncertainty about their future. These psychological symptoms can manifest as difficulty sleeping, loss of appetite, and decreased motivation. Over the following months, the individual may gradually adjust to their new circumstances and actively seek support from friends, family, or mental health professionals. While the process of recovery may involve ups and downs, the individual's psychological well-being slowly improves. They may engage in self-care activities, such as exercise, meditation, or hobbies, to manage stress and regain a sense of control over their life. After several months, the individual's psychological symptoms subside, and they return to a baseline level of functioning. They may feel more optimistic about their career prospects, explore new opportunities, and rebuild their confidence and resilience in the face of adversity.

Resilience consists of various factors that promote personal assets and protect us from negative appraisals of stressors; however, it is conceptually distinct from hardiness, coping, and recovery. Hardiness is about responding to situations with commitment, control, and challenge; thus, it is an important component of a broader resilience construct that also involves overcoming adversity. Hardiness is so closely related to resilience that the correlation between scores on Connor-Davidson Resilience Scale and Hardiness Scale is .74. (Nezhad & Besharat, 2010).

In terms of coping, resilient individuals often engage in effective coping strategies (Major et al., 1998). However, resilience elicits a positive response to potentially stressful situations, whereas coping can be positive (e.g., encouraging self-talk) or negative (e.g., abusing drugs or alcohol). Moreover, resilience influences the way in which individuals appraise situations, whereas coping is a response to how they appraise them. In other words, a resilient individual is likely to see a situation as a challenge and engage in effective coping strategies. A less resilient individual might see a situation as a threat and engage in maladaptive coping strategies such as avoidance.

Lastly, resilience involves maintaining a stable equilibrium (Bonnano, 2004), which reflects an individual’s capacity for stress resistance. Although resilience may involve some initial distress following a trauma, the dominant response pattern is relatively stable and involves positive emotional states before and after the trauma without significant downward peaks. On the other hand, recovery typically involves extended periods where individuals are “not doing well” in response to a trauma, which is then followed by recovery or a return to normal (Bonanno, 2005).

Understanding Organizational Resilience

Before going into methods on building individual resilience, it’s important to consider the role of organizational resilience as it relates to the challenges that students are likely to encounter in their professional lives. Organizational resilience is the “ability to bounce back, or recover from challenges in a manner that leaves the organization more flexible and better able to adapt to future challenges” (Denhardt & Denhardt, 2010, p. 333). Within the realm of business education, the concept of resilience extends beyond mere survival to encompass strategic agility, innovation, and transformative adaptation. Resilient organizations in this context demonstrate the ability to leverage adversity as a catalyst for growth and renewal, fostering a culture of continuous learning and improvement.

Business education plays a pivotal role in equipping future leaders and managers with the skills, knowledge, and mindset necessary to navigate complexity and uncertainty. By integrating principles of resilience into curricula and pedagogical approaches, business schools can cultivate a new generation of leaders capable of driving organizational resilience in diverse contexts. Research indicates that exposure to experiential learning opportunities, case studies, and simulations can enhance students' ability to anticipate and respond to disruptions, thereby fostering resilience (Waddock & Lozano, 2013).

In an era characterized by rapid technological advancements, globalization, and geopolitical uncertainties, organizational resilience has emerged as a strategic imperative for businesses across industries. Research suggests that resilient organizations outperform their peers in terms of financial performance, innovation, and stakeholder trust (Linnenluecke & Griffiths, 2010). By proactively investing in resilience-building initiatives, organizations can enhance their capacity to navigate turbulent environments, capitalize on emerging opportunities, and sustain long-term competitiveness.

In order to develop resilient organizations, it is necessary to understand the obstacles that are likely to test an organization’s resilience and the characteristics of resilient organizations. To address the first issue, Hamel and Valikangas (2003) identified four key challenges that organizations should consider: (1) cognitive; (2) strategic; (3) political; (4) ideological. Cognitive refers to organizations having a realistic view of their capacities and the challenges

they face now or in the future. Strategic refers to how organizations can develop new alternatives and options in response to new opportunities. Political refers to diverting resources and supporting "experiments" seeking new and novel approaches to problem solving. Finally, ideological refers to becoming opportunity driven rather than focusing on its existing models and systems. What this means is that organizations need to be ready to accept the realities of their situation, identify strengths, weaknesses, opportunities, and threats related to their internal and external environment, approach challenges from different perspectives and come up with new ways of solving problems, and be open to changing not only the way things are done but the issues being addressed. An organization that can do all of these things will be well-positioned to turn adversity into opportunity.

As for the second issue, the literature on resilient organizations has revealed several key attributes. These include: (1) redundancy, (2) robustness, (3) flexibility, (4) reliability, and (5) a culture of respect and trust. Excess capacity, or redundancy, allows organizations to survive even if one component of the organization fails. For instance, in over 50 years, Southwest Airlines has never had a layoff. One of the reasons for this is that while other airlines were doing stock buybacks, Southwest held cash in reserves for a rainy day. When the COVID-19 pandemic hit and travel came to a halt, Southwest was ready. It probably comes as no surprise that Southwest's long-time CEO, Herb Kelleher, said "Your employees come first. And if you treat your employee's right, guess what? Your customers come back, and that makes your shareholders happy. Start with employees and the rest follows from that." His focus on redundancy was just one of the many ways he attempted to take care of his employees. Business education programs can emphasize the importance of maintaining excess capacity and reserves to withstand unforeseen challenges. Case studies like Southwest Airlines can be analyzed to understand how strategic financial management and prioritizing employee well-being contribute to organizational resilience.

The second attribute, robustness, refers to promoting psychological and physical health of employees. For instance, Ernst and Young created a special program during the pandemic which offered free childcare, access to therapy via an app, a 12-week mindfulness-based stress reduction program, and daily group counseling sessions for parents and caregivers. The evidence is clear that promoting employee health enhances engagement and job satisfaction while reducing turnover. Since turnover can cost upwards of 2-3 times an employee's salary, there are clear economic benefits to this approach as well. Educational initiatives can focus on promoting the physical and psychological health of employees, especially during times of crisis. Examples such as Ernst and Young's comprehensive support programs during the pandemic can inspire businesses to prioritize employee well-being as a strategic investment.

The third attribute, flexibility, refers to an openness to try new approaches rather than doing something because "that's how we've always done it." When American, Maintenance, and Engineering Services (AMES) was struggling to staff nuclear outage maintenance projects, they decided to take a first principles approach to solving the problem. Aristotle defined a first principle as "the first basis from which a thing is known." It means breaking down problems into their most basic assumptions of what we know is true. When they looked around at why they were having issues with staffing, they realized that the issue wasn't that there weren't enough people available. It was common knowledge that accidents like 3-mile Island caused a whole generation of workers to avoid the nuclear industry, leaving a workforce that was mostly on the verge of retirement. However, that wasn't the problem. The issue, in its most basic form, was that there was a lack of sufficient training programs and awareness of the benefits and safety of working in the industry. In order to address this, they identified community colleges within close proximity to all 93 operating commercial nuclear reactors and developed programs that were tailored to their needs. Students who made it through the programs were offered guaranteed employment starting at more than 3 times the median income of U.S. residents. While most companies would have tried to recruit from a severely shallow pool of workers, they solved the root cause of the problem by taking a more flexible approach. Business education can encourage a mindset of adaptability and innovation, challenging traditional approaches and fostering creativity in problem-solving.

The fourth attribute, reliability, refers to building and maintaining resilience through infrastructure. Just as an organization's culture needs to be institutionalized through policies and practices, resilience must be constantly fostered through the management of resources, effective communication, and data. For instance, Google's people analytics team has become famous for utilizing a data-driven approach to inform practices, programs, and processes. By constantly monitoring key performance indicators (e.g., retention, hiring, etc.) and their proximal antecedents (e.g., employee attitudes), they can resolve vulnerabilities before they have a chance to grow. For instance, Google found that it was wasting thousands of hours each year by having candidates interview with almost a dozen people across several days. They found this out after analyzing five years of interview data, which revealed that there was no value add beyond four interviews. In other words, they realized that 3-4 interviews were enough to make the best hiring decision. As a result, they were able to make the hiring process more consistent and efficient by making sure that no

one interviews more than four times. Educational programs can stress the importance of establishing reliable systems and processes to support organizational resilience. Examples such as Google's data-driven approach to people analytics demonstrate how continuous monitoring and analysis can identify vulnerabilities and inform proactive strategies.

Lastly, a culture of respect and trust refers to fostering a culture in which people feel that they're treated with dignity and where they can take risks or admit mistakes without fear of punishment. For instance, in his book "An Astronaut's Guide to Life on Earth," Chris Hadfield talks about working the problem when they encounter issues or someone makes a mistake. Rather than try to point blame, which could waste precious seconds in space, he and his colleagues remain calm, rely on their training, objectively assess the situation, determine how best to resolve it, and put together best practices to ensure that the problem doesn't arise again, or if it does, they'll be able to address it quickly. In another example of building a culture of trust, an executive at a large pharmaceutical company had recently lost 3 million dollars on a failed marketing venture. When he was called in to meet with the CEO, he knew he'd be fired. But when he went into his office, he wasn't met with blame or anger. Instead, he was asked to describe what happened and how they can prevent it from occurring again. He said, "You're not going to fire me?" and the CEO replied, "why would I fire you, I just invested 3 million dollars in you. I want you to make mistakes…Just don't make the same mistake twice."

Organizational culture is one of the most powerful aspects of resilient organizations, but many leaders don't have a strong understanding of how their employees view their culture. It can be incredibly difficult to change culture, so it is necessary to be intentional about an organization's values, infusing them into policies and practices and communicating them to everyone in the organization. Some aspects of an organization's culture are visible (e.g., does the CEO have a corner office, or does she sit in a cubicle like Zappos' executives?). However, many aspects of culture are invisible, making it difficult to identify without a systematic method such as interviews and surveys. Fortunately, there are a number of cultural assessments that assess aspects of culture ranging from safety to adaptive capacity and many can be conducted in-house without the need for expensive consulting firms. Business education can focus on cultivating a culture of respect, trust, and psychological safety within organizations. Infusing examples such as the pharmaceutical leader responding to mistakes into lectures can emphasize the importance of fostering an environment where individuals feel valued, empowered, and supported to take risks and learn from failures. By providing students with practical tools and frameworks for assessing and shaping organizational culture, business education can empower future leaders to build resilient organizations that thrive in dynamic and uncertain environments.

Theoretical Underpinnings

Extant research has demonstrated myriad ways to enhance resilience at the individual level. A common theme among resilience enhancing interventions is the notion that resilience is largely related to the way in which individuals appraise situations. They are grounded in the transactional model of stress and coping (Lazarus & Folkman, 1984), which tells us that it's not what happens to us that predicts our outcomes, but how we appraise and respond to life events (e.g., Lazarus & Alfert, 1964). Cognitive appraisal theory states that individuals go through a cognitive-emotional process of appraising stimuli in terms of a threat or challenge and, based on resources, determines his or her capacity to cope with the stressor. The ensuing coping strategy has been shown to enact nearly polar responses depending on how the stimulus is perceived (e.g., Podsakoff, Lepine, & LePine, 2007).

To gain a better understanding of the appraisal process, Nobel Laureate Dr. Elizabeth Blackburn and her colleagues examined the effect of stress and adversity on telomeres. Telomeres are the protective ends of our chromosomes. They are analogous to the plastic ends that keep our shoelaces from wearing down. Telomeres break down over time, causing aging and leaving individuals more susceptible to disease and illness. Unfortunately, this means that as we get older and our telomeres break down, our immune systems become weaker, we see physical signs of aging, such as wrinkles, and we're more susceptible to cancer, cardiovascular disease, and other maladies.

After her initial discovery of telomeres, Dr. Blackburn's colleague, Dr. Elissa Epel, told her about a group of women she was studying who were facing extreme adversity. The subjects in her study were mothers of children with chronic illness and disease. As a result, they were under enormous and prolonged psychological stress. When they looked at the health of their telomeres, Drs. Blackburn and Epel found something that changed our understanding of stress and aging. The telomeres of mothers in the chronic stress condition were significantly shorter than mothers in a control group with healthy children. However, what was particularly astonishing was that not all mothers in the stress condition exhibited the same type of telomere deterioration; some had telomeres that were long and healthy.

How can two mothers dealing with the same adversity respond so differently? Why is one aging faster than the other? The answer is in how they perceive their situation. The more subjects perceived their situation as stressful, the shorter their telomeres. This meant they were more likely to become ill and have a shorter life span. The mothers with healthy telomeres were aging less quickly because they perceived their situation not as a threat day in and day out, but as a challenge. This group was more likely to say, yes, this is hard, but I'm so grateful for every day with my child. It's not that they were blindly optimistic; on the contrary, they fully understood the challenges ahead. They simply accepted their situation and felt that they had the resources (e.g., family support, gratitude, optimism, spirituality, a sense of purpose, etc.) needed to overcome it. The other group, understandably, saw their situation as a threat. As a result, they were more likely to say, "I don't know how I can possibly get through today. Every day is harder than the last." This sense of helplessness further aggravated their situation, causing them to engage in maladaptive coping strategies (e.g., denial, withdrawal, etc.).

The good news is that it is possible to enhance resilience by developing resources that will help individuals view situations as challenges rather than threats. The benefit of doing so is that they will not only become more resilient, they will be less stressed and experience greater physical and emotional well-being. Studies have shown that enhancing resources can lead to a number of health benefits, including cellular resiliency in various bio-physiological markers (Hunsberger et al., 2022), better psychosocial coping skills, such as increased resourcefulness (Ayala & Manzano, 2014), and more support-seeking behaviors that bring about access to support outside of one's family (Valentine & Feinauer, 1993).

COMMON APPROACHES TO BUILDING RESILIENCE

The most common method to enhance resilience involves changing the way people appraise threats and adversity. This can be accomplished through activities such as cognitive reappraisal, enhancing self-efficacy, and training in attention control (e.g., cognitive control training and mindfulness).

Cognitive Reappraisal

Cognitive reappraisal, which refers to an attempt to reinterpret an emotion-eliciting situation in a way that changes its meaning and alters its emotional impact (Lazarus and Alfert, 1964), can help mitigate emotional and physiological responses to stress by increasing activation in the prefrontal cortex while decreasing activation in the amygdala (Ochsner et al., 2009). The former is responsible for cognitive control and the latter for processing fearful and threatening stimuli. Much of this research is focused on changing the way individuals appraise situations so they can view them in a way that enhances resilience and helps them to overcome adversity.

When individuals reappraise stressful situations more positively, they enhance their ability to adapt and grow their resilience (Troy & Mauss, 2011). In fact, studies have shown that individuals who frequently engage in positive cognitive reappraisals have greater well-being and generally more positive outcomes than those who don't use this coping mechanism (John & Gross, 2004).

Research on cognitive appraisal has shown that *"differences in appraised situational meaning explain why persons have different emotional responses to the same objective situation"* (Tomaka et al., 1997, p. 70). Situational meaning, a central aspect of cognitive appraisal theory, refers to how a person appraises ongoing events in relation to personal relevance and coping capabilities. It is determined by how individuals experience life events and their subsequent judgment of their relevance (e.g., is it a threat, neutral, or positive?). It can be influenced by manipulating how a task or situation is framed, such as through benefit finding, where individuals are directed to focus on positive aspects of their situation.

Self-efficacy

Self-efficacy is defined as an individual's belief in their capabilities to mobilize the motivation, cognitive resources, and agency to exert control over a given event (Bandura et al., 1999). In other words, it refers to the belief that we can achieve whatever goals we set out to accomplish. Competence builds confidence; in order to enhance self-efficacy, people are typically trained in particular skills needed to meet a specific challenge. Afterward, they're gradually exposed to relevant stressful situations which are more and more difficult (Southwick & Charney, 2012). After they master one situation, they're moved onto a more challenging situation. As they progress, each individual accomplishment has a cumulative impact on self-efficacy, creating a virtuous cycle of accomplishment and a belief in oneself.

It is our belief in our ability to produce a certain outcome that forms the foundation of human agency. When facing adversity, individuals who retain the belief that they can exert control over their thoughts or actions are more likely to persevere. They are also more likely to reject negative thoughts about themselves or their abilities (Ozer & Bandura, 1990). As Henry Ford stated*, "Whether you think you can, or you think you can't--you're right."* When individuals are high in self-efficacy, they believe they can successfully perform the behavior required to produce a successful outcome. The extent to which they believe this is true will determine how much effort they are willing to put forth in the face of adversity (Bandura, 1977).

Self-efficacy is often confused with self-esteem, which is similar but not the same. The former refers to beliefs about one's ability to succeed, whereas the latter refers to beliefs about one's value and self-worth. Both are useful when it comes to resilience, but it is possible to have low self-esteem and still persist in the face of adversity because of high self-efficacy. In other words, an individual may not hold a favorable view of themselves, but they can still be resilient because of their beliefs about their abilities. In this way, self-efficacy is closer to self-confidence or the attitude one has about their skills and abilities. The main difference is that one can be high in self-efficacy and believe they can perform in such a way that will bring about goal attainment. However, if they are high in self-confidence, they might feel strongly that they can or can't bring about a certain outcome.

In order to increase our self-efficacy and become more resilient, we can draw from four sources identified by Dr. Albert Bandura, who coined the term self-efficacy: (1) mastery experiences; (2) vicarious experiences; (3) verbal persuasion; and (4) physiological arousal or emotional states. The first refers to the experiences we gain when taking on new challenges and succeeding. For instance, if a student believes they are bad at public speaking, they could take on increasingly challenging tasks or presentations that allow them to enhance their skills. This doesn't mean that they should find the biggest audience or the hardest speech in their first attempt. The key is to be successful, so just as an aspiring pianist would start with a few simple notes, they could be challenged to start small by taking a public speaking class or taking part in a short presentation where they can slowly build a belief in their ability. Each successive win accumulates so that as they enhance their skills, their belief in their abilities grows and they are able to take on greater and greater challenges.

The second source, vicarious experience, refers to observing peers succeed. The greater the similarity between an individual and the person they are observing, the stronger the effect that observation will have on them. In other words, seeing someone whom an individual deems similar to themselves succeed at a task that they want to accomplish opens up the possibility that they can do it as well. Consider the case of Roger Bannister. When he ran a mile in under four minutes, it was thought to be impossible. But doing so broke down the walls of impossibility and inspired so many other runners to do the same. This is why it is important to give business students the opportunity to work closely with others at different skill levels so they can observe what might be possible for themselves.

The third source, verbal persuasion, refers to the feedback individuals receive from others, where positive reinforcement and negative reinforcement can alternately raise or lower efficacy expectations. Verbal persuasion doesn't have as strong of an effect on one's self-esteem as personal experiences, but it demonstrates the influence that others can have*: "… if people receive realistic encouragement, they will be more likely to exert greater effort and to become successful than if they are troubled by self-doubts"* (Wood & Bandura, 1989, p. 365). This is especially important when it comes to students because they often lack the life experiences necessary to build a firm sense of self-efficacy. That's not to say that students should only be given positive feedback, it does mean that educators need to be cognizant of the impact of their feedback on students. People who can accept criticism are more likely to grow and develop, but that criticism needs to be framed in a way that encourages rather than discourages others.

The fourth and final source of efficacy refers to affective or emotional arousal. Negative physiological states, such as anxiety, have been shown to negatively impact self-efficacy (Usher & Pajares, 2008). For instance, at one point there was a common and decidedly false stereotype that women were not as good at math as men. This manifested into what is called a stereotype threat, where people tend to behave in ways that conform to stereotypes about their social group (e.g., race, gender, cultural, etc.). Researchers were able to amplify this threat by telling female participants who were about to take a math test that men do much better. In this case, the women did significantly worse than a control group that was not primed for failure. However, the researchers were then able to mitigate this threat by telling the participants that there were no differences in performance between men and women. This time the differences in performance between men and women were actually eliminated (Spencer, Steele, & Quinn, 1998). By removing the emotional priming involved in the first experiment, they were able to mitigate stereotype threat.

In order to maintain a sense of self-efficacy, individuals need to learn how to manage their emotions. There are several ways to do this such as through a cognitive anxiety coping technique called growth mindset development. This involves helping individuals believe that their ability is not fixed, but changeable and improvable through continued efforts (Dweck, 2006). It can include identifying one's current mindset, helping to reframe certain attributes (such as intelligence) as malleable, and goal setting. Research on student fears about their ability to learn statistics has demonstrated that anxiety can be reduced through such interventions (Smith & Capuzzi, 2019). Another method which we will go into next is mindfulness training, a subset of cognitive control training.

Cognitive Control Training

Cognitive control training shows people how to selectively direct their attention toward positive information and relevant negative information. At the same time, it teaches them to filter out irrelevant negative information. Related to this, mindfulness is another method that teaches us how to focus on the present moment. It refers to paying attention on purpose, in the present moment, without judgment. This training involves learning how to bring yourself back to the present moment, notice what is being experienced (e.g., "I'm feeling or I'm thinking"), and deciding what to do with it (e.g., "I'm going to see it for what it is, simply a thought or emotion and let it go"). Drs. Southwick and Charney (2012) have found that learning how to direct one's attention helps to modulate appraisals of threat, enhance emotional regulation, and decrease negative biases.

Mindfulness is the opposite of mind wandering. According to mindfulness expert John Kabat-Zinn, it means paying attention in a particular way, on purpose, in the present moment, and non-judgmentally. Mindfulness involves moment-to-moment awareness of bodily activities, emotions, feelings, or sensations, while purposely observing and discarding any distracting thoughts that come into focus. Although Buddhists have used it for centuries, mindfulness wasn't considered as a therapeutic tool in the west until the 1970s. It was around this time when scholars in psychology, neuroscience, and medicine started finding more and more evidence for the positive impact of mindfulness on attention, cognition, emotions, behavior, and physiology. More recently, it has been linked to reduced levels of perceived stress, work-family conflict, negative moods, and burnout. Those who practice mindfulness report higher levels of well-being, self-compassion, psychological capital and resilience (Roche, Haar, & Luthans, 2014). Being mindful means paying attention to and being aware of present events and experiences in a non-judgmental way. This often takes the form of traditional meditation, but it can also involve accepting your thoughts and feelings, being fully present during a conversation, or even paying close attention to the smell, touch, and taste of your food.

Meditation and mindfulness are often used interchangeably, but rather than thinking of meditation as mindfulness, you can think of it as a path to mindfulness. The more we meditate, the more mindful we become. One of the more common forms of meditation, breath work, involves consciously controlling one's breathing. For example, by taking longer exhales than inhales, you'll activate the parasympathetic part of your autonomic nervous system, which slows your heart rate, reduces blood pressure, and tells your brain that it can relax. It's often referred to as the "rest and digest" system as opposed to the sympathetic nervous system, which is a network of nerves that helps your body activate its *"fight or flight"* response. It's difficult to feel relaxed and anxious simultaneously, so breath work is a useful tool for staving off negative emotions.

In a recent study using a mindfulness-based stress reduction (MBSR) program, participants went through eight weekly training sessions (2.5 hours each) and a one-day retreat. They learned practices such as meditation, body scans, yoga, and how to deal with intrusive thoughts (Zou et al., 2020). The authors found that MBSR training made participants more objective and less reactive to stressful stimuli. When facing adversity, it's common to make judgments about it. For example, a student seeking to study for a difficult exam might think, "this is terrible, I'll never do well." It's this type of irrational thinking that arises from being judgmental and overly reactive to potentially threatening events. However, when they learn to be more objective, it becomes easier to sit back and accurately assess their situation to determine the best path forward. This helps them to do away with rigid thinking styles that tend to depict situations as unchangeable and uncontrollable. It also reduces ruminative, depressogenic thinking, which almost always leads to distress and a reduction in resilience (Thompson, Arnkoff, & Glass, 2011).

DISCUSSION

Cognitive appraisal theory provides an essential framework for understanding how individuals perceive adversity and ultimately overcome it. Adversity is a precipitating condition of psychological resilience, but in order for it to lead to positive outcomes, individuals need to feel that they possess the resources necessary to overcome it. We attempted to outline three specific resources, cognitive reappraisal, self-efficacy, and cognitive control training. Although these are

distinct concepts, self-efficacy and cognitive control training likely play a vital role in the cognitive reappraisal process. Thus, they can be considered as individual resources or mechanisms which support the reappraisal process.

As previously discussed, the ability to persevere through adversity versus succumbing to it hinges on how individuals assess their circumstances and derive meaning from them. To navigate and conquer life's challenges after leaving academia, it's crucial for business education to help provide students with resources that are greater than the demands that they will face. Achieving this requires two key elements: Firstly, helping students build a solid foundation of resources to draw upon during tough times. Secondly, helping them to recognize that the appraisal process is subjective; thus, perceiving that they possess sufficient resources to tackle obstacles is essential. On the other hand, even with abundant resources, a perception that resources are lacking can hinder progress, leading everything to appear as a threat and prompting maladaptive coping strategies.

CONCLUSION

In conclusion, the pursuit of individual and organizational resilience within the context of business education represents a multifaceted endeavor that requires proactive leadership, strategic foresight, and a culture of innovation and adaptation. By integrating principles of resilience into curricula, pedagogy, and organizational practices, business schools can prepare future leaders to navigate uncertainty, drive change, and build resilient organizations that thrive in dynamic environments. As we confront the complexities of an increasingly volatile, uncertain, complex, and ambiguous world, the imperative of fostering resilience has never been more pressing. Through collaborative efforts at individual, organizational, and societal levels, we can cultivate a future where resilience is not merely a response to crisis but a fundamental attribute of organizational excellence.

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StartupWorld 1.0: Entrepreneurial Simulation

Manuel Tarrazo, University of San Francisco, California, USA

ABSTRACT

This paper describes a classroom-based simulation of a startup in its early stages. Offered as an introduction to a 12-hour, 2-week module during a graduate entrepreneurial finance course, the simulation provided students an economical and straightforward overview of basic concepts and processes in early-stage startups. It also led students into rather specialized technical material, such as first-round valuation and capitalization (equity/ownership allocation) and the importance of team formation and human resources/capital in attracting funding in early stages. The simulation achieved these goals by focusing on social interactions through role-playing (i.e., founders, funders, professionals). Furthermore, the simulation engaged students, motivated them to learn, and provided them valuable feedback. This paper provides all the necessary information readers may need to replicate the simulation described and experiment with it (e.g., concept, steps, protocol, Microsoft Excel support, calibrations).

Keywords: Business simulations, entrepreneurship and startups, behavioral simulations, role-playing, experiential learning.

INTRODUCTION

This contribution shares an entrepreneurial simulation in the form of a spreadsheet-based pedagogical tool. It was a response to a particular (and not easy to solve) teaching challenge that the author/instructor faced when teaching in a nonstandard mode.

I, the author/instructor, had to teach a course entitled International Entrepreneurial Finance in a 12-hour teaching module, arranged into four segments of 3 hours each. The module is part of the Master Level II Masters in Strategy and Entrepreneurship offered by the University of Paris II (Université Panthéon-Assas, Groupe Sorbonne). The task was challenging because of the following specifics. (A) I was not able to count on uniform and appropriate student preliminary knowledge (e.g., accounting, financial theory, specific financial calculations). (B) Students with diverse backgrounds, ranging from general business management to business law, pass through the usual business specializations (e.g., marketing, administration, international business, finance). (C) Students have various interests. Moreover, (D) the most important entrepreneurial finance building blocks require time and have a technical nature that many students, entrepreneurs, and professionals, even those working in startup-related fields, find rather difficult to assimilate. Furthermore, the situation had the following inescapable, nonnegotiable requirements:

1. To highlight the entrepreneurial experience and practices in the United States in a manner that would integrate with and contribute to the efforts by current private and public sectors in France to promote startups (e.g., https://lafrenchtech.gouv.fr/en/).
2. To be cognizant of and build upon French economic and business history and traditions.

Point 2 above is not just a matter of business courtesy or cultural sensitivity. France, similarly to the United States, had a considerable amount of scientific research available for transformation into business ventures during the last quarter of the 19th century and the beginning of the 20th century. France also seemed to have an early start in modern business education—for example, in creating the world's first business school, École Spéciale de Commerce et d'Industrie—today's ESCP—founded by Jean Baptiste Say in 1819. What else happened in addition to business-ready science and business schools that set various pathways for entrepreneurial practices in different countries? Some of the issues this discussion brings up are relevant today, for example, the balance between large firms, smaller ones, and startups at the economy and career levels. It is important to note that students in the course may or may not choose to work in a startup, or they may work for large firms (BNP Paribas, Orange) as they interact with startups.

It is appropriate to provide some information concerning entrepreneurship and to supply readers with some context and foundations to understand the challenges my students encountered in this 2-week course and how the challenges were addressed. Briefly stated, textbooks usually identify four periods in entrepreneurship creation: (1) the development stage, in which abstract ideas are evaluated as viable business opportunities (e.g., product and service generation, first noncommercial market trials, or alternative revenue models); (2) the startup stage (initial production and sales plans with the objective to observe real market traction); (3) the survival stage, in which significant funding

is required and the company must gain a foothold in the market and provide numbers (sales, profits, market share) large enough to justify the investments made; (4) the rapid growth stage; and (5) preparation for "liquidity events" (usually acquisitions), initial public offerings, or consolidation of a market presence as a private firm. The stages above also describe financing. Early stages include the idea, the startup, and the survival stage. However, at each of these successive stages, the stakes (i.e., money needed or risk borne) increase, often very dramatically, especially during the survival stage. The founders' financing as well as friends and family may help in the very early stages. Later on, professional investors, such as angel groups and venture capitalists, enter as formal or informal syndicates or networks (see Leach and Melicher, 2018).

I needed a tool to make sure students were familiar with the above concepts and stages, particularly those taking place at the early stage and leading to first-round valuation and capitalization (equity/ownership allocation). I describe the resulting simulation, which I have titled StartupWorld 1.0, in this paper.

One special focus of this communication is to showcase the capabilities of spreadsheet tools to address the challenge I faced. A well-designed spreadsheet served as the point of departure, highway, and vehicle to integrate and summarize most of the technical material and reach the desired learning goals. In addition to providing illustrative computations on demand, the spreadsheet tool served as a territory and a presentation tool capable of integrating diverse pieces of information (e.g., pictures, formulas, link). In other words, I present here the interplay between the challenged faced, the design, and the characteristics of the spreadsheet-based tool, as well as how it was implemented and the resulting success. Contrary to a regular every-semester course, my particular teaching assignment does not lend itself to experimenting with other tools and comparing outcomes.

The first section describes (1) the simulation itself; (2) the very critical internal calibration factors that provide coherence, realism, and educational productivity; and (3) a brief discussion of the trial applications. A brief second section places the simulation experience in the wider context of computerized pedagogical tools, such as proper (stand-alone) simulations and gaming. Concluding remarks and references close the paper.

STARTUPWORLD 1.0 ENTREPRENEURIAL SIMULATION

As noted earlier, time limitations (a 2-week class with just four 3-hour sessions) significantly reduced the number of pedagogical aids (and simulation types) to consider. The simulation would have to take a modest role in terms of time used (30 minutes per session at most) and contribute considerably to the teaching–learning experience, while having little or no direct weight in the grading per se. In addition, it would have to fulfill rather specific responsibilities: engage students, offer hands-on practice with key concepts in startups, and provide some flavor of "Silicon Valley ways" (connections to the storied area in California, south of San Francisco, are still a big draw when teaching in Europe. It is also the area where I live and teach).

Professor Mollick's state-of-the-art simulation, the Startup Game (TSG), offered much of what I was seeking, but some of its characteristics did not fit the aforementioned rigid and unavoidable constraints. TSG focuses on the early days of several startups, when various agents tried to progress with their projects. A carefully designed module in the simulation assigns roles (e.g., venture capital, angels, founders, or professionals). Another module provides connectivity, with an email system complementing direct communications. The TSG setup provides room for many players. According to its teaching manual, the proprietors have "tested the game with over 2,000 players—MBAs, undergraduate, and executive students," (Mollick, 2014, p. 4). To target such a wide variety of players, TSG incorporates many different types of firms, considering entrepreneurial and investing motivations and ways to capture intangible elements present in entrepreneurship, such as apparent (or real) chaos, connections, social and interpersonal skills, and ambiguity. It also allows the instructor to cover areas such as diversity, complexity, and the establishment of multiple goals. Two particularly noteworthy merits of TSG are the potential to replicate the social aspects of entrepreneurship, and TSG's kaleidoscopic integration of the many auction-like interactions characterizing entrepreneurship and startups.

Again, the time available and pedagogical constraints of my course excluded TSG from being an option. To maximize every minute of class time, I had to come up with methods (1) to assign value to human resources in each startup, and (2) to minimize the search and discussion regarding startups. The methods had to respect the risk and randomness conditions in new venture creation. In addition, I followed a hunch that the ideal solution lay not in software, but in a more traditional gaming platform—a deck of cards.

The Simulation

I used a regular deck of 52 playing cards to address the first issue, assigning value to human resources. The poker combinations with which most readers will be familiar (e.g., pairs, straights, full houses) reflect the value of putting together a human team in which diversity of skills and talents leads to better outcomes. A two-of-clubs card may not look like much, but paired with a three, four, five, and six, it beats a trio of aces. This reflects the real world of startups; a founder must seek out effective teams and complementary skills, rather than disconnected trump cards. As in the real world, investors who examine and appreciate founders' ability to put together such teams are generally well served. I chose four existing early-stage startups to address the second issue; more about this later. Table 1 presents the resulting StartupWorld 1.0 simulation game.

Table 1. StartupWorld 1.0: Simulation description and mechanics

Name StartupWorld 1.0
Goal Engage and inform learners through a carefully calibrated simulation of early-stage startup processes.
Setting Startup founders select professionals to form optimal teams; Investors (venture capital, angel groups) allocate their funds to select startups; outcomes are simulated and reflected upon.
Materials

- 16 badge identifiers: 4 * 2 = 8 student identifiers representing four startups; each startup, two students; 2 * 2 = 4 students, each pair representing a different venture capital firm; 2 * 2 = 4 students, each pair representing a different angel group.
- 1 pack of standard playing cards with 52 regular cards plus two jokers. Optional: 14 extra badge identifiers for the professionals: 30 – 16 = 24 professionals (professionals and managers). Optional: poker chips or play money representing funds

Numbers

Students in the classroom	30
4 startups, each with a founder team, each founder team composed of 2 students	8
2 venture capital investors, 2 students per VC firm	8
Professionals (staff/managers, and line employees)	14 = 30 – 16

Funds

Each startup receives $1 million, used to assemble human resources (professionals and employees).	$4 million
Each venture capital firm receives $1 million.	$2 million
Each angel group receives $500,000.	$1 million

Sessions

- Session 1: Students separate into professionals, founders, and funders. Cards are randomly distributed to each professional (14 students receive 3 cards each = 48 cards).
- Session 2: Startup founders assemble teams of professionals (staff/directors and professionals).
- Session 3: Funders invest in the startups.
- Session 4: Outcomes are determined with an Excel file. Brief instructions are given to each student on how to create a report on the experience that can be used for grading.

Students were divided into founders, funders, and professionals. The founders were given a preselected firm at random; with four preselected firms, there were two student founders per firm. The funders were put into pairs, and each pair was assigned one of two roles—venture capitalists or angel group. In a classroom of 30 students, eight were founders, and another eight were funders, which left 14 students to act as professionals. Each professional received three cards from the shuffled deck. Students were told that lower card numbers reflected more humble roles (e.g., security and low-level coding), and aces and face cards represented higher status roles, such as chief executives. The students were also reminded that, much like in poker, what matters most is not the cards players initially receive but how they play them. We were after the value of combinations, which the traditional poker hands helped to convey.

As the reader has surely anticipated, the account of the simulation up to this point suggests careful calibration may be needed for the simulation to be useful at all. This is exactly the case, as I will show in our next section.

Calibration internals and details

This section presents what can be referred to as the simulation "internals," those items requiring calibration for everything to work as intended. The main objective of this component is to show that what matters is not the isolated value of a employee, but the value of the group as put together by the founder. Any isolated card (employee, professional) is worth is numerical value (e.g., 2, 3, 4, and so on, multiplied by a given numerical factor). However, when each of those employees/professionals are considered as part of a cohesive, well integrated group, those isolated employees actually turn into executive teams showing powerful synergy effects.

The top of Table 1 presents the values assigned to each card number and to their poker combinations. The value of each card was calculated by multiplying its number by a numerical factor (6,000). Certain cards (i.e., jack, queen, king, and ace) were assigned a higher number to reflect their a priori value, that is, their value before any combinations is taken into account. Poker combinations add such "group effects." These group values were computed using each inverse probability times a factor plus a benchmark number ($1,371,875.00 = [3,906.25 * 300] + 200,000). Each startup founder was instructed to form the best combinations possible by negotiating with the professionals, using initial financing of $1M. The final value added to the startup was the sum of combinations, plus the "loose change" (unmatched cards) calculated using the top table in Table 2. In the next round of the simulation, human resource value was one of the items used by funders (angels and venture capitalists) to decide how much to invest in a firm. The founders use the provided to them to "hire" those students whose cards will maximize the value of the "hand" –i.e., total human resources value.

Additional information concerning the 52-card deck, its history, and probabilities of poker hands can be found in the corresponding Wikipedia entries (e.g., Standard 52-card deck - Wikipedia, List of poker hands - Wikipedia, and Poker probability - Wikipedia). A brief introduction is provided so that all students know how to play.

Students chose specific ventures from a list of actual startups, which saved a considerable amount of time and let students identify with the characteristics of each startup. Table 3 provides details on the initial and end values for each venture. The names in the leftmost column (i.e., Koena, Beepings, Timescope, and Suricog) are those of actual startups selected by students; more about that in the following section. We followed a variant of what is sometimes referred to as the venture capital valuation method (see Leach and Melicher, 2018, pp. 304 and ss.). The typical or benchmark firm we had in mind was a technology startup that might have experienced a rapid growth pattern, some customer-funded and some generated (at least in part) by intangible capital assets. Each of the founders was initially assigned such a type of generic firm, with the expectation that it would reach a value of approximately $10M in 5 years ($10,756,480.00, precisely). For the students acting as funders (either venture capitalists or angel groups), we calculated a theoretical fair value (present value) of $2M for each firm. This present value reflected the firms' business models, human resource capital, and expected future values ($2M = $10,756,480.00 / $[1+0.4]^5$), which would imply a yearly compounded rate of return of 40% (40% = 0.40 = [$10,756,480.00 / $2M]$^{1/5}$ - 1). This theoretical $2M initial value would normally be used to calculate percentage equity values as well as the numbers and values of equity shares. However, in our simulation, we used the value of the firm after putting together its human resources teams (professionals, executives, etc.) as pre-funding value. The final value of the firm was calculated by adding funders' investments. Take, for example, the case of Koena, whose final valuation was $3,326,362.74 = $2,601,362.74 + $725,000.00—more about Koena's case later on. In addition, we assumed that the economy would have a growth rate of 4% during this 5-year period, which all the firms in our simulation would enjoy. This 5-year period of 4% assumed economic growth rate increased Koena's final value to $4,047,028.88.

Elements of randomness were introduced to the simulation at this point. The value after the 4%, 5-year period was multiplied by a variable that played a role similar to that of a price-to-value-per-share ratio. For instance, Koena's $4,047,028.88 value ended up trading 12 times higher, or $48,564,346.58. These final values were used to compute rates of return and investors' (and professionals') rewards. The provided rates of return are realized compound rates between the pre-money and the final, post-randomness returns. In Koena's case, that was 79.57% = ([$48,564,346.58/$2,601,362.74]$^{1/5}$) - 1. Note that the expected return for our typical $2M firm was approximately 50%. Interestingly, the actual returns for Time-scope and Suricog were close to that value but for different reasons. Time-scope was able to put together a strong team but drew a low multiple. Suricog did not add additional value through human resources but drew a higher multiple than Time-scope. The winner of the simulation was Beepings,

which not only put together the strongest human resources team but also drew the highest multiple.

Table 1. StartupWorld 1.0: The value of human resources

Assigned values to playing cards

factor		6000		
	-	deck 1	employees	
cards		2	12000	
		3	18000	
		4	24000	
		5	30000	
		6	36000	
		7	42000	
		8	48000	
		9	54000	
		10	60000	
	jack	16	96000	
	queen	25	150000	
	king	25	150000	
	ace	30	180000	
			$ 900,000.00	value per suit
	n	13	$ 69,230.77	average value
	4 suits	52	$ 3,600,000.00	total value
	cards per student		3 or 4	

Team values as determined by poker combinations

Combination	Probability	1/prob(x)	Executives
Four of a kind	0.026%	3906.25	$ 1,371,875.00
Full house	0.170%	588.2352941	$ 376,470.59
Flush	0.367%	272.479564	$ 281,743.87
Straight	0.760%	131.5789474	$ 239,473.68
Three of a kind	2.870%	34.84320557	$ 6,663,441.00
Two pair	7.620%	13.12335958	$ 203,937.01
One pair	49.900%	2.004008016	$ 200,601.20
Highest card	100.000%	1	$ 200,300.00
			$ 9,537,842.35

Table 2. StartupWorld 1.0: Capitalization, returns, and rewards

The firms and expectations

time window	5
econ growth	4%
current value (PV)	$ 2,000,000.00
expected returns	40%
future value basis	$ 10,756,480.00

	initial valuation, t=0	initial funidng for human resources	before-funders teams & executives	investments funders, t=0	after-funders valuation, t=0
Koena	$ 2,000,000.00	$ 1,000,000.00	$ 2,601,362.74	$ 725,000.00	$ 3,326,362.74
Beepings	$ 2,000,000.00	$ 1,000,000.00	$ 2,954,202.96	$ 999,000.00	$ 3,953,202.96
Time-scope	$ 2,000,000.00	$ 1,000,000.00	$ 2,823,345.15	$ 892,000.00	$ 3,715,345.15
Suricog	$ 2,000,000.00	$ 1,000,000.00	$ 2,051,122.36	$ 317,000.00	$ 2,368,122.36
Totals: equity	$ 8,000,000.00		$ 10,430,033.21	$ 2,933,000.00	$ 13,363,033.21

Outcomes

Case A: "Smooth sailing" case

	valuation, t=0	pre-randomness 5-years with econ growth	times random mult post-randomness t= 5	Realized, actual returns	random multipliers
Koena	$ 3,326,362.74	$ 4,047,028.88	$ 48,564,346.58	79.57%	12
Beepings	$ 3,953,202.96	$ 4,809,675.86	$ 72,145,137.83	89.48%	15
Time-scope	$ 3,715,345.15	$ 4,520,285.46	$ 22,601,427.30	51.59%	5
Suricog	$ 2,368,122.36	$ 2,881,182.94	$ 20,168,280.60	57.96%	7
Totals: equity	$ 13,363,033.21	$ 16,258,173.14	$ 163,479,192.31	73.39%	

Case B: "Tough times" case

	valuation, t=0	pre-randomness 5-years with econ growth	post-randomness t = 5	Realized, actual returns	random multipliers
Koena	$ 3,326,362.74	$ 4,047,028.88	$ 80,940,577.64	98.88%	20
Beepings	$ 3,953,202.96	$ 4,809,675.86	$ 48,096,758.55	74.72%	10
Time-scope	$ 3,715,345.15	$ 4,520,285.46	0.00	-100.00%	0
Suricog	$ 2,368,122.36	$ 2,881,182.94	$ (28,811,829.43)	-269.64%	-10
Totals: equity	$ 13,363,033.21	$ 16,258,173.14	$ 100,225,506.77	57.23%	

The way I have set the above-described valuations in Excel allows for more than one outcome. The simulation can be run more than once to emphasize the randomness of tech startups in Silicon Valley and the fluctuations in the broader economy. Pressing F9 in Excel will provide different numbers, and the user can adjust lower and upper values to add drama and realism or to reflect particular market conditions. For example, the bottom table in Table 3 presents a "tough times" case, in which some multiples are negative, resulting in a reduction of value. The "tough times" case for Time-scope, for instance, would result in a firm without market value, whose investors do not see any return. This may happen, for example, if their project was dependent on acquiring a government permit that did not materialize. The "tough times" case for Suricog was more severe and represented a case in which the startup faced not only zero returns but also liabilities. For example, one could picture a startup project that resulted in damage to the environment or, perhaps more appropriate for this case, the health of its customers.

Table 4. StartupWorld 1.0: Equity recognition and ownership incentive plans

Pre-money valuation: Investments are not included in the before-investors valuation of the firm
The valuation used is pre-investors' money

	No incentive plan		Incentive plan	
Class	Valuation	%	Valuation	%
Founders	**$2,601,362.74**	78.20%	$2,000,000.00	60.13%
Employees pool	$ -	0.00%	$601,362.74	18.08%
Investors	$ 725,000.00	21.80%	$ 725,000.00	21.80%
Totals	$3,326,362.74	100%	$3,326,362.74	100%

Post-money valuation: Investments are part of the initial value of the firm
The valuation used is after-investors' money

	No incentive plan		Incentive plan 23%		Incentive plan 20%	
Class	Valuation	%	Valuation	%	Valuation	%
Founders	$1,876,362.74	72.13%	$1,275,000.00	49.01%	$1,356,090.74	52.13%
Employees pool	$ -	0.00%	$601,362.74	23.12%	$ 520,272.00	20.00%
Investors	$ 725,000.00	27.87%	$ 725,000.00	27.87%	$ 725,000.00	27.87%
Totals	**$2,601,362.74**	100%	$ 2,601,362.74	100%	$2,601,362.74	100%

The exhibits include some other numbers I have not mentioned up to this point, but they are important for coherence and realism. For example, the total values per suit of cards, and for the whole deck, determine the value added by human resources to a founder's startup. The totals for funds available and startup opportunities should also reflect plausible, desired relationships (e.g., abundance or scarcity) between demand and supply for investable funds. The growth rate of the economy may be set to reflect alternative investing opportunities for participants. Value multiples could also be bounded to reflect different industries, entrepreneurial areas, or stages of growth.

As with any simulation, this one had its limitations. In the end, however, they contributed to the learning process, as well. First, randomness played a significant role in the outcome. This is true of real-world startups, and the numbers used to compute valuations might reflect over- or undervaluation. Given the uncertainty levels, the simulation shows that what matters most to get deals and ventures going in startups' early stages is often little more than agreement among parties. Furthermore, the randomness used is actually pseudo-randomness, because we do not know what type of randomness Mother Nature and Father Market will deliver. However, by considering various outcomes, such as a "smooth sailing" versus a "tough times" case, the simulation can touch upon some of the uncertainty, anxiety, frustration, and broken dreams that are inherent to entrepreneurship and startups. Third, startup agents (e.g., funders, investors, professionals, and even ordinary employees) may seem unrealistic and greedy if they are demanding rates of return that do not exist. Note, however, that their demands need to factor in potential losses, which are not like those in other areas of the economic spectrum. For example, a 50% return in an entrepreneurial area that registers an 80% failure rate must be adjusted down, and the "greedy" 50% turns into a much more modest 10% when we perform the corresponding calculation (50% * 20% = 10%).

Koena's case shows the importance of this third issue. We first introduced a generic firm originally valued at $2M. Then, we adjusted that number to reflect the value of teams (i.e., Koena going from $2M to a $2,601,362.74 pre-funding value). This paved the way for the firm to handle incentive ownership plans. In Koena's case, the extra $601,362.74 would be the equity earned by professionals/executives in such an incentive ownership plan. Table 4 presents details concerning (1) how incentive plans affect the startup and (2) introduces how value recognition before and after funding determines how proceeds will be shared.

With respect to (1), note how the equity percentages are calculated. Funders (i.e., venture capitalists and angels) will not be affected by the decision to fund an incentive plan; their share does not change within any of the tables. The equity will come out of the founders' shares. As for the second issue of value recognition, at the top of the exhibit, we

have the "pre-money" valuation equity participation basis. The $2,601,362.74 is recognized as founder's equity, and the funders simply add to that for a total of $3,326,362.74. However, several arguments can be made for seeing the funders' investments as necessary to achieve all the expected growth and returns. This is the "post-money" equity participation basis. In this case, founders are only entitled to $1,876,362.74 (= $2,601,362.74 – $725,000.00), and their equity participation decreases from 78.20% to 72.13%. However, the funder's equity increases from 21.80% to 27.87%. At this point, an additional complicating factor arises. The $601,362.74 the founders were going to allocate to employees and staff amounted to 23.12% and left the founders with 49.01% voting power. This means that, in addition to potential governance issues, professionals and investors have the majority and, thereby, the ability to vote the founders out of the firm. A 20% incentive ownership plan would return the voting power majority to the founders. Incentive plans play a role in other important areas, such as the design of work-compensation labor contracts. Participation in profits is one way to share wealth creation with all those who contribute to it. Furthermore, in economic sectors in which the returns on capital have more favorable dynamics than wages and salaries, equity incentive plans are the surest and most direct way to diminish income inequalities. In the United States, they play an important role in retirement planning, as well.

At this point, we have gone deep into entrepreneurial finance territory, just as the simulation and its calibration are designed to do for the participating students. Our next and final step is to report some feedback from the first application of the simulation.

First use: brief discussion

The first time I used this application was in my 2018 course, International Financial Strategy, at the University Panthéon-Assas (Paris II, Sorbonne University Association). (Course: Stratégie financière internationale. 2017–2018. Master 2. Management stratégique et entrepreneuriat. Finalité professionnelle. Université Panthéon-Assas (Paris II, Association Sorbonne Université). 12 Place du Panthéon, 75231, Paris Cedex 05, France.) I have used it successfully several more times since. Focusing on the first use highlights the value of the simulation to address the challenge faced. Students were briefly and informally debriefed, but there was not time to run surveys. What I convey here is the interplay between the challenges faced, the design and characteristics of the spreadsheet-based tool, and that it worked well.

There were 30 graduate students with diverse backgrounds (e.g., law, economics, and business), professional experience, and interests (e.g., different aspects of entrepreneurship, startups, and innovation). The students were assigned roles as described in the previous sections, and the described protocol was used. On day one, the startup founders formed teams of professionals. On day two, VCs (venture capitalists) and angels invested. On day three, we simulated the outcomes, discussed technical aspects, and reflected on those aspects and outcomes. On day four, students received instruction on how to complete a required report on their roles and experiences. The simulation occupied between 30 and 45 minutes at the end of each 3-hour class session.

I spend most of my time teaching in the San Francisco Bay Area, which includes Silicon Valley. Therefore, part of my teaching was to introduce French students to what could be described as "Silicon Valley ways." France is the fifth largest economy in the world, with a size comparable to that of the state of California. The French economy has many large and well-known global companies, as evidenced by the status of firms in the Paris stock exchange, the CAC-40. France also engages in established international trade and finance patterns and rather dynamic internal business activity. Coming from San Francisco, it was suitable for me to set up things in a way that would highlight some connection between the San Francisco Bay Area and France. Using poker cards provided such a connection. Card and board games are an intrinsic part of French and American cultures and have long been used as educational tools in each country. It turns out that what we have blandly referred to as "the standard card deck" has an interesting history and provenance from Paris, where it is known as *le jeu de cartes*. The suits in the deck of cards represent (with some variations due to local usage) different parts of society—nobility, clergy, military, and business (agriculture or trade and commerce). Their learning power originates in their directness, economy of resources, and use of symbolic representation, which allows for multiple meanings. Each student was familiar with the cards and the equivalent poker combinations. The interested reader may find additional information in the corresponding Wikipedia entries (i.e., French playing cards - Wikipedia, Jeu de 52 cartes — Wikipédia, and Poker — Wikipédia)

As mentioned previously, having some firms of interest already chosen relieved the instructor and students from having to come up with startup ideas in the short time available. It also provided another bridge between France and the San Francisco Bay Area. The selected startups— Timescope, Koena, Beepings, and Suricog—were part of the

group of French startups presented at the January 2017 Consumer Electronics Show (CES) in Las Vegas, an annual trade show organized by the Consumer Technology Association (8 companies to discover at CES! | French Tech Hub, https://frenchtechhub.com/2017/12/8-companies-to-discover-at-ces/)

Another connection that might surprise readers is France and Silicon Valley's mutual fascination with startups and entrepreneurial tradition, which is noticeable in the large and busy French community in the San Francisco Bay Area. The current French president, Emmanuel Macron, has accompanied French startups to CES in the past and has visited the French community in the Bay Area. Startups in France and the San Francisco Bay area are supported by initiatives of the French government, at regional and republican levels (La French Tech; the Tech Hub, an incubator inaugurated by President Hollande in 2014, located in San Francisco's Dog Patch neighborhood; and PRIME, Paris Region Mission Enterprise), and by other private initiatives (e.g., regional chambers of commerce and the French–American San Francisco Chamber of Commerce).

Because of these connections, the simulation/game worked its charm in expected and unexpected ways. Students were highly engaged, intensively trading cards while forming teams, and then collaborating with their "bosses" (the founders who hired them) to attract funding. Funders meticulously evaluated each company's business plan, demonstrable market potential, and early revenue signals. I was surprised by the intensity of what I had envisioned as a friendly competition and by the students' help in making things work.

THE SIMULATION—CONTEXT AND PROJECTIONS

There are business simulations that target specific contexts (e.g., a car rental company or the whole car rental industry) and that often take the form of laboratory learning. However, business simulations can also be part of the more general and ambitious realm of modern, technology-enhanced experiential learning. Take, for instance, the work of the Association for Business Simulation and Experiential Learning (ABSEL, https://absel.org/). The group sponsors a yearly conference, the first of which took place in 1974, and two blind-peer-reviewed publications: *Simulation & Gaming: An International Journal of Theory, Design and Research* and *Developments in Business Simulation & Experiential Exercises*. Portable document format versions (PDFs) of studies from the conference proceedings are available at ABSEL's site and include links to a wide array of simulations and experiential learning software (follow the menu to "Resources" and "Games"). There, readers can find simulations, technologies, and experiential tools to add to their existing teaching resources. For readers who wish to venture even further from the abovementioned resources, the following three inroads will be helpful: (1) textbook authors and sponsored products by educational publishers, (2) commercially available software, and (3) games with educational content.

I first decided to investigate various educational simulations as I prepared for a semester-long graduate course called Entrepreneurial Finance. Although I had occasionally taught Entrepreneurship and Small Business Management, my primary area of teaching and research had long been finance, and my Entrepreneurial Finance textbook (Leach and Melicher, 2017) did not include an accompanying simulation. Other textbooks from which I drew while preparing for the course did not mention any simulations, either. I decided to develop an educational simulation in the usual business ways (computing) via my Excel files. That proved to be a good decision when I had to provide a 2-week graduate teaching engagement at the University of Paris II (Panthéon-Assas). As noted earlier, the terms of my engagement specified four 3-hour class sessions focused on international aspects of entrepreneurship. I wanted something that would (1) be engaging and showcase the "Silicon Valley way," 2) provide key technical components in entrepreneurship (valuation, team work, sources of risk, and capitalization and employee engagement plans, and 3) be compatible with private and public entrepreneurial initiatives in France.

I studied Kiholm, Smith, and Bliss (2011), which provided access to *Venture*.SIM and analyses of versions of the @Risk and Crystal Ball simulation packages, as well as Fabozzi (2016) and Lerner, Leamon, and Hardymon (2012), who discussed the plethora of resources available through their institutions. Lerner et al. led me to the Wiley line of products (e.g., ZOOM, see https://www.wiley.com/legacy/products/worldwide/canada/sc/difference/businesssim.html) and Experiential Simulations. Harvard Publishing (https://hbsp.harvard.edu/simulations/) took me to an array of simulations for business with several choices in each field of business education (entrepreneurship, finance, marketing, operations, organizational behavior, and strategy). The MIT Press lead took me to management simulations emphasizing strategy, sustainability, and system dynamics (https://mitsloan.mit.edu/LearningEdge/simulations/Pages/Overview.aspx). Prof. Ethan Mollick's entrepreneurship simulation, TSG, was close to what I had in mind. As I will explain in the next section, I could not use Mollick's

simulation, given my restrictions, but it was helpful.

I also explored the Internet. The abovementioned inroads came in handy. A search for commercially available software yielded the following brand names, sites, or products: Marketplace Simulations, Interpretative Simulations, Airline: A Strategic Management Simulation, smartsims Business Simulations (mikesbikes and others), GlobStrat-Academy Strategic Management Simulations, SIMULTRAIN® Strategic Management, CAPSIM, Micromatic: A Strategic Management Simulation, Cesim Global Challenge Strategy & International Business Management Simulation, Strategic Management Airline Simulation by Julio León on Prezi, The Business Strategy Game (marketed by McGraw-Hill Education), BizMap Business Strategy Game (Free), and Hypster CEO 2 (for mobile phones). Widening the search range to include various ages, programs, and modalities (e.g., computing, mobiles, and board and card games) with terms such as "fun board games," "educational board games," "finance games," and "mobile games," I came upon products such as GoVenture (http://mediaspark.com) and Tycoon Games, amongst others.

I came across two early games that included some of the features I found useful in my own simulation, for instance, initiating the game by using an introductory session to set the role playing (e.g., investors and entrepreneurs), as in Low, Venkataraman, and Srivatsan (1994), and offering students choices for ventures or industries based on actual entities, as in Dos Santos (2018). Given my knowledge of spreadsheet modeling and technical expertise in my field, my minimalist search and these two examples were enough to initiate and complete the project that addressed my challenge: Ethan Mollick's Startup Game (several years of updates) and the aforementioned work by Dos Santos (2018).

Entering into a pedagogical simulation and a gaming mindset is to realize that a given job can be done with alternative tools. This was the case in the StartupWorld simulation with the representation of a personnel management-recruiting risk (using playing cards) and economic and venture performance (using spreadsheet-generated random numbers). It gets even better; parallel to the release of awe-inspiring, high-tech, state-of-the-art computer simulations and games, one can find enjoyable versions of many of those games using humble boards. This happens in technical areas of finance, as the reader can see by searching for "educational-board-games-money-management" in a browser. This, in itself, deserves scholarly research.

Searching for potential games to be used in educational environments through the major software distributor Steam (https://store.steampowered.com/) is not only fun but also reveals dozens of products to try.

CONCLUDING COMMENTS

As I noted earlier, I have shared the description of a challenging situation I faced and the spreadsheet-based response that helped me successfully meet the challenge. I have plans to integrate this tool in other, more regular teaching engagements, which would provide opportunities to try out alternative versions, and perhaps compare the tool presented with stand-alone simulations and/or games.

My success, the students' feedback, and early reviewers of this note encouraged me to share my experience. An early evaluator (without a business education background) of the simulation and materials presented in this paper noted,

> The title—StartupWorld 1.0—suggests computer software, and new software at that. In fact, what is most remarkable about this piece is that, if readers follow your prescriptions, they can run an effective simulation *without* having to dig up and train themselves in new software—in fact, they only need three things most readers already possess: a deck of cards, an Excel spread sheet, and some knowledge of math.

A dedicated evaluator, seemingly a business and entrepreneurship educator with ample background in simulations, noted, "If a special focus is made on finance, and the measured outcomes that are learned in finance from this particular simulation versus another, or versus a standard classroom technique, this could be a very valuable project."

Modern business education offers us wonderful resources and its share of difficult challenges. It seems that the time is ripe to enhance our teaching with simulations and gaming tools. As the Startup 1.0 example shows, there is always some room for improvement by using straightforward simulation and games, no matter how limited the initial resources are, particularly when students lend a hand.

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Manuel Tarrazo is a Professor of Finance at the School of Management of the University of San Francisco. His research interests focus on decision-making (households and firms), quantitative analysis, portfolio formation and optimization, and entrepreneurial investing.

Active Learning: Positive Impact on Student Mental Health, Engagement, and Course Learning

Craig A. Calvert, University of Connecticut, Connecticut, USA

ABSTRACT

Active learning can have a positive impact on student learning and on student mental health. In-class activities are a common method of active learning and have been shown to be effective in teaching course fundamentals and as tools to reinforce course material. The impact of active learning on the educational value is well studied, but the impact on student mental health is less studied. The activity developed for this course was successful as demonstrated by student responses to questions. Responses by students to post-activity questions, demonstrated that the interactions with other people during the activity positively impacted student mental health. The results of this paper demonstrate that when considering the use of active learning in courses, student mental health should be considered along with the academic utility.

Keywords: Active Learning, Student Engagement, Mental Health, Operations Management, In-class Activity

INTRODUCTION

Objectives

Modern students are looking for ways to connect to peers and instructors in the classroom. This contrasts the passive lecture techniques that are traditionally used which have limited opportunities for students to connect (Park & Choi, 2014). Students have commented that sitting in in-person classes is not much different than online classes. In the in-person classes, the students come in, sit down, listen to the lecture, then leave. Most of the times with little interaction with the person next to them or the instructor. Active learning increases the interactions in the classroom and creates a more connected student experience and potentially increased performance (Freeman et al., 2007). The activity described in this work was developed as part of a desire by the instructor to have an active learning-focused course, because research has shown that active learning promotes student engagement and connections (Jin Cho et al., n.d.). Finally, given that COVID-19 had an impact on students outside of the classroom, anything that can be incorporated into a classroom to increase student mental health should be considered (Birmingham et al., 2023; Browning et al., 2021). This paper will outline the activity and will include student thoughts on the impact of this activity on their mental health.

Background on Active Learning and Student Engagement

Traditional lectures have depended on a one-way transference of knowledge from the instructor to the students. These traditional lecture-style courses provide minimal student-to-student or student-to-instructor engagement. This engagement can be important in the college learning experience (Selvaraj et al., 2021). A traditional way to engage students is using semester-long projects which reinforce the course material (Caligiuri et al., 2020; Calvert, 2021; McCarthy & McCarthy, 2006). While these longer engagement tools are useful, it might not be desirable for the instructor or fit into the course structure. Another method to engage students is through shorter active learning opportunities such as in-class activities. One review paper analyzed the literature for in-class activities and compiled the following main categories (Arthurs & Kreager, 2017). The categories are 1) individual non-polling, 2) in-class polling, 3) whole-class, and 4) in-class group activities. There are some subcategories and background on learning theory that could help the reader that is not already familiar with these topics. The reader should refer to the reference work for a thorough analysis and examples. The first category is the simplest and involves posing a question or short quiz question(s) for individual students. This can be made engaging by asking students to "turn to your neighbor" and work together. Polling is a way to engage students by posing a question and having students answer this question (Caldwell, 2007; Smith et al., 2011). These can use a self-assessment where the instructor reviews the answer on the next slide or they can use a clicker or audience response systems (ARS) to increase the interactions and provide the instructor with immediate feedback on student understanding of the lecture material (Caldwell, 2007; Freeman et al., 2007). These clickers were shown to have a neutral to positive impact on the students' perception of their learning, while also providing important real-time feedback to the instructor. This active learning was shown to improve those who were at high risk of failing (Freeman et al., 2007). An example of a whole class activity is one where the entire class or a majority of the class is dedicated to working on one problem. This problem is more detailed and requires students to provide a longer and generally more in-depth analysis (Calvert, 2020; Patterson et al., 2023). Finally, some research has shown that active learning promotes increased student mental health (Ribeiro-Silva et al., 2022).

Guidance to Reader

This activity has taken over five years to refine and could undergo further refinement as needed to meet student or curricular needs. The reader should see this as a starting point for their classroom and feel free to adopt it to fit various classes and teaching methods. Whatever the actual use, understanding how to develop an activity designed for engagement and how to run the activity is also valuable for those developing engaging activities. The use of these techniques has produced positive student experiences and increased student-to-student interactions and student mental health.

METHODOLOGY

Learning Goals, Objectives, and Outcomes

Upon completion of the activity, students will be able to apply process strategy terminology and concepts discussed during the class lecture and in the written assignments. Table 1 shows the learning goals, objectives, and outcomes. The first goal of this activity was to give students time to practice using the course material orally. Without an activity, there is not much time for the students to practice oral use of the material. Lectures, homework, and tests do not give students an opportunity to use the terminology orally. Listening for proper use is one of the key tasks for the instructor during the activity. This can also be assessed by asking questions to students or other interactions. Another goal was to improved reading comprehension. This is something that students can always use help in improving. The written directions are relatively short, so it was important that students listen to the oral instruction to provide context and detail. One specific direction was to get the scissors and tape only after the group's process map is complete. Each class had at least one person immediately go to get the tape and scissors before even starting the activity. The instructor can then politely remind the student to get them after the approval of the process map. The next goal was to construct a process map as discussed in the oral directions and as modeled in one of the course slides. Then the students used that process map for a prototype and redesigned the process map to improve the process parameters – including time. The final goal was to have the students participate in a process to make a real product – a paper box. The students selected the process to make the boxes that were made and actually used that process. This got the students interacting with the process and seeing how a process can be used. The idea of process strategies became more tangible to them after completing the activity.

Table 1: Learning assessment table outlining the goals, objectives, and outcomes

Goal	Objective	Outcome
Technical vocabulary use - oral	Students will need to use terms from the course material to complete the activity	The instructor will listen to group conversations during the activity to identify correct usage of terms
Reading comprehension	A set of specific parameters will be asked for in the construction of the box	Students will follow directions to create a correct box with the instructor reviewing the boxes during the activity
Construct a process map	A process map to build paper boxes will be developed by the student following the activity instructions	Students will write-out the process map on a piece of paper demonstrating the ability to construct a proper process map
Perform a process redesign	Ask students to assess their initial process map after constructing a prototype box	Critical thinking skills will be used to determine if the process could be improved
Use a process strategy for a real product	Require students to select one of the process strategies discussed in the course material and use it to construct paper boxes	Students will be able to differentiate the process strategies reviewed in the course material and identify strengths and weaknesses of the chosen process

Activity Details

This activity was delivered as an in-class activity in an introductory operations management course in a school of business. These courses were over a five-year period and had class sizes range from 35 to 140 students per section. For smaller classes only one instructor was needed. For larger sections, one instructor and two teaching assistants were available to observe and answer questions during the activity. The instructor should provide a separate lecture on process strategies in the previous class (as performed for this paper) or as a lecture directly before the activity. The separate lecture scenario works for a course that meets twice a week; the lecture directly before would work for a course that meets once a week.

Students were provided instructions on how to complete the activity in a Microsoft Word file – see Figure 1. An oral walk-through was performed by the instructor before the activity was started. A description of each section is provided next.

Figure 1: Student directions for the process strategy activity

Process Strategy – Directions

Overview

Your group has been assigned the task to develop a process to produce paper boxes out of an 8½ x 11-inch sheet of paper with as little waste as possible. During the activity, practice using as much of the vocabulary as possible. Each **group of four** will be provided with paper, scissors, and tape.

Specifications

1. Manufacture a box out of an 8½ x 11-inch sheet of paper
2. One side must have a triangle on it of any color and large enough to be legible
3. One side must have a circle on it of any color and large enough to be legible
4. One side must have a flower on it of any color and large enough to be legible
5. One side must have the brand name "Mega Box" on it of any font or color

Directions

1. Choose the **type of process strategy** your group will use to complete the activity
2. Develop a **baseline time-function map** for making the box
    a. **Estimate the time** for each step and record it on the map
3. **Show your process map to a TA for approval BEFORE getting supplies**
4. **Make a prototype** box following the baseline map that was developed
    a. A sample template is included with the materials
    b. **Time each** process step and **record it**
5. Perform a **process redesign** of the **baseline map** based on making the prototype box
    a. **Record comments** on recommended improvements
    b. Develop a **target time-function map**
6. Manufacture 5 boxes using the redesigned process map
    a. **Time each** process step and **record it**
7. **Look at the boxes** being manufactured by other groups and note differences or similarities

Questions

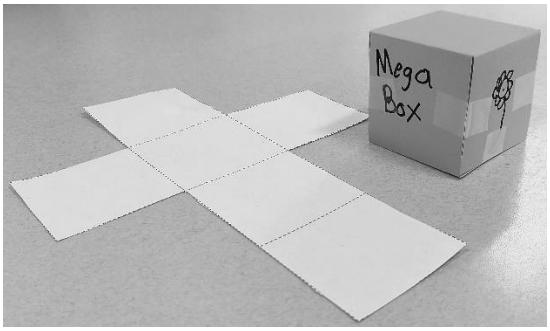
*Submit your **baseline map**, **comments** on improvement, and **target map** with the answers below.*

1. How close were your estimated process step times to the actual times?
2. What were the process improvements that the group implemented after the prototype?
    a. Compare the time to produce the prototype with the times to produce the boxes using the redesigned process. What happened to the time? Was this the expected result?
3. How was your box different than other boxes? What caused these differences?
4. Compare the process strategy that your group chose with the other ones discussed in this chapter
    a. What process strategy did you use, and why did you choose the strategy you did?
    b. Having completed the activity, would you suggest another strategy?
        i. Consider time, cost, and scope implications
    a. How would your process change and what technology would you introduce into the process to manufacture 1,000 boxes a day?

In this activity, students worked together in a group to construct paper boxes – see Figure 2 for a picture of a completed box and the template that was used. Note that the instructor can determine if the quality of the boxes is important; that could be included in the parameters section. The quality of the constructed boxes was not a parameter for these classes. Four students are needed to complete the activity. If needed, groups of five work better than groups of three. They will use instructor-provided materials, with each group needing the following materials.

- A white sheet to draw the process map on.
- A pen or pencil to draw the process map.
- One template printed on standard 8½ x 11 inch sheet of paper. Any online one will work.
- One pair of scissors to cut out the boxes.
- Clear tape to hold the boxes together.
- Marker or other writing utensil to draw and write on the boxes.
- Five pieces of cardstock to assemble boxes in the second part.

Figure 2: Picture of a completed box with the template



Specifications
The specifications section provided details to add to the boxes. Specifications was a vocabulary word introduced in the class and gave students exposure to what a specification was and how it is involved in the process of constructing a box. This also was included as part of the learning goal of reading comprehension. The students needed to read each specification and ensure it was met.

Directions
The directions section led the students through the activity steps. It started with selecting one of the process strategies discussed in class. They then created a baseline time-function process map. This required them to not only create a map but consider the time needed to complete each step. To confirm that the process map was completed properly, the instructor (or teaching assistant) reviewed and approved each group's process map. After approval, they would get the box making supplies. The next part was to create a prototype box to test the designed process and obtain time values. These were used to determine revisions to the process map and update the time estimates. The final step was to assemble five boxes based on the revised map.

Questions
To assess whether students met the learning goals, questions were provided as an after-activity assignment. The questions were formatted as an exit-ticket type (Paz-Albo Prieto & Hervás Escobar, 2016). This allowed students to not become stressed over doing the activity perfectly and instead focus on the box-making process. These questions were answered as a group and submitted for grading. If there is class time available, these questions could be used for an after activity review. Listed below are questions asked after the activity. The questions were developed to get the students to think about the activity and discuss the results. The questions asked the students to consider the time estimates. This was asked to get the students to understand that estimates are not always accurate and that a process improvement can improve the values. The next question asked them to observe other boxes and notice the differences. This demonstrates the importance of clear specifications, as the students from different groups drew different flowers, used different fonts, and used different colors. The final question was focused on applying the class material thus allowing them to connect the theory with the practical activity. These combined questions allowed for assessment of the stated learning goals.

RESULTS AND DISCUSSION

To assess student reactions to the activity, several questions were asked. These questions were asked for multiple sections. The responses were analyzed, and representative word clouds were generated to visualize key words from the responses. The responses were collected from two undergraduate courses with a total of 77 students.

The first two questions were asked to assess the educational value of the activity, and they are listed below.

- Question 1 – SUMMARY: What one word would you use to describe the activity?
- Question 2 – LEARNING IMPACT: Discuss how the activity impacted your understanding of the course material.

Question 1 was asked to provide a quick reaction to the activity. The most used word was fun with engaging and tedious next – see Figure 3. It is interesting that fun was the most used word, as most students would not use that word to describe the typical college class. Engaging would be linked to fun and shows that they connected to the activity. Tedious might not be expected but makes sense in the context of the activity. This activity has multiple different steps with sub-steps. Considering that one learning goal was reading comprehension, having students decipher long, multi-part directions could be seen as tedious by the students. Question 2 asked about how the activity helped with understanding of the course material. The most used words were helped, understand, and activity – see Figure 4. The comments regularly discussed how the activity made the student slow down and think about process design. Responses also discussed how the activity simulated real life and/or how process strategy works. These clearly indicate that the overwhelming response was positive on the understanding of the course material.

To examine the impact on the student personally, three follow-on questions were asked. The questions are listed below.

- Question 3 – PEER ENGAGEMENT: Discuss how the activity helped to improve your engagement with your classmates. For instance, what would be different about your peer-to-peer engagement without the activity?
- Question 4 – PERSONAL INSIGHT: How does engaging with your classmates improve your learning of the course material?

- Question 5 – PERSONAL INSIGHT: How does engaging with your peers in activities help you socially/emotionally throughout a semester? Does it improve your social/emotional health? If so... how? If not... why?

Figure 3: Question 1 – What one word would you use to describe the activity?

Figure 4: Question 2 – Discuss how the activity impacted your understanding of the course material.

Question 3 was asked to understand how student interactions would be different in the class without the activities. Figure 5 is the corresponding word cloud. Engagement was the most used word with people a close second. The written comments regularly discussed the idea of working with others and "bounce(ing) ideas" off each other. There were also students who commented that without this activity they would not have engaged with anyone else in the course. Question 4 was developed to understand if student engagement helped with learning course material. The word cloud, shown in Figure 6, reflects the written statements. Students found that engagement provided new perspectives and helped them understand the material. Finally, Question 5 was posed to obtain personal insight into student engagement impacts on student mental health. The corresponding word cloud, Figure 7, has people, class, improves, and health as the most used words. These are powerful words to see, as the students indicated that engaging activities can positively impact student mental health. That is, engagement can "lessen the impact of feeling overwhelmed… while learning."

how the activity helped to improve your engagement with your classmates.

Figure 6: Question 4 – How does engaging with your classmates improve your learning of the course material?

Figure 7: Question 5 –How does engaging with your peers in activities help you socially/emotionally throughout a semester?

Overall the reactions were very positive and indicate that not only did the students find the activity helpful in understanding the course material, they also found it beneficial for improving their personal mental health.

CONCLUSIONS

The process strategies activity described in this paper was a successful activity given that it not only met the stated learning objectives, but it also helped to improve student mental health. The activity was designed to incorporate the learning goals, objectives, and outcomes. These are seen in the directions that were developed. The questions provided students the opportunity to record their results and also reflect on how the activity applied to the course material. These questions were presented as exit ticket questions. This was done to minimize the stress of getting the expected "right" answers and instead allow students to explore different ways to approach the activity.

The impact of this activity was demonstrated in the student responses. They clearly found the activity fun and educational. During the activity, the classes were full of students talking, smiling, and laughing. There was a positive energy even in the larger classes. That is, larger classes were as engaged as the smaller classes. The responses to the peer engagement and personal insight questions demonstrated the positive impact activities can have beyond the course material. Students were able to use this activity to get to know other students and understand that they are not alone in their college experience. Understanding that student engagement in an active learning environment can have a positive impact on student intellectual growth and personal mental health is important for college instructors. Knowing this will allow instructors to design course activities that produce productive and happy graduates who will be better able to handle the intellectual and emotional challenges after graduation.

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Craig A. Calvert, PhD, MS-BAPM, CHO is currently an Assistant Professor-in-Residence in the Operations and Information Management Department at the University of Connecticut. His interests are in teaching, active learning, supply chain management, sports analytics, and project management. He is also the winner of several School of Business teaching awards and a university-wide teaching excellence award.

Innovations in Conserving Resources in Direct Assessment of Student Learning: The Value of the Second Reader

May H. Lo, Western New England University, Massachusetts, USA
Janelle Goodnight, Western New England University, Massachusetts, USA

Abstract

The second reader approach is regarded as a preferred practice in direct assessment of student learning. It is, however, costly. Most universities and colleges increasingly face a challenge of meeting more demands with shrinking resources, which motivates schools to find ways to conserve resources. This study explores the possibility of reducing costs consumed in direct assessment. Using assessment data from a private university, this study examines two research questions: (1) Do assessment results differ between the second-reader approach and instructor approach? (2) If the results differ, what characteristics are associated with the differences? Our results show that the appropriateness of adopting instructor approach to conserve assessment costs is contextual. It is best suited for quantitative or well-structured courses. Suggestions for future research on conserving assessment resources innovatively are also discussed.

Keywords: assurance of learning, direct assessment, second reader approach

INTRODUCTION

To assess student's learning for the purpose of establishing quality academic programs, and particularly for AACSB-accredited universities and colleges (U.S. Department of Education, 2018), business schools may use direct and/or indirect assessment methods. Direct assessment collects evidence of students' work. Often standardized tests (either commercially available assessment tools or locally designed assessments) are used by business schools to provide information on student learning (Wray et. al, 2020). Other direct measures include a variety of methods associated with faculty-agreed on rubrics, such as individually written assignments and/or course embedded assignments, oral assignments, evaluated case responses, systematic evaluations of teamwork assignments, simulations, mock interviews, etc. (Kelly et. al, 2010). A professional then reviews the work and makes a judgement regarding what a student has learned. Indirect assessment, on the other hand, uses proxy measures, such as surveys or focus groups of graduating students, alumni, employers of alumni, supervisors of interns, and/or recruiters to infer what students are probably learning (Kelly et. al, 2010; Shaftel and Shaftel, 2007). Both direct and indirect measures of student learning are used by faculty within the Assurance of Learning (AoL) process to guide changes to a curriculum or program with the goal of improving student learning and/or updating program learning objectives.

What *is* relevant to the curriculum and program improvement process is to anchor the outcome variable of change to student learning (Anderson, 2023). For clarity, 'direct' assessment is based on inferences made by professionals based on reviewing work provided by students. It is not a 'direct' assessment of what truly resides as knowledge within each student's brain. However, AACSB standards have traditionally inferred higher value of and focused primarily on direct measures of student learning in revisions to the AoL Standard 2003 onward (Hogan et. al, 2012; Zocco, 2011). As we currently do not have a more accurate measure of what resides within a student's brain, professional reviews of student work and/or standardized exam scores are considered 'direct assessment.' In general, colleges tend to rely more on direct assessment than they do on indirect assessment, as noted in the 2023 AACSB State of Accreditation Report.

In the context of direct assessment, a question arises regarding who should judge students' performance and decide what was learned and how well it was learned. Some colleges let the teaching instructor be the judging professional (instructor approach), while some colleges prefer other faculty not teaching the course be the judging professional (second reader approach). Each approach has its advantages and disadvantages. Universities and colleges generally regard the second reader approach as a preferred practice in direct assessment of student learning (Gardiner et. al, 2010). It is, however, costly. In the meanwhile, most schools increasingly face a challenge of having to meet more demands with shrinking resources, which motivates schools to find ways to reduce costs as much as possible. Although the second reader approach has its benefits, such as objectivity and quality control, if their assessment results are not significantly different from those of the instructor approach, then schools may adopt the instructor approach to conserve resources. The purpose of this study is to empirically examine the differences, if any, in assessment results

between instructors and a second reader assessment team. Note that another available approach to direct assessment is for a university to invest in a Major Field Test (MFT) offered by the Educational Testing Service or other commercially available assessments (Wray et. al, 2020). In this case, the school pays a fixed price for each test taken. As a result, cost conservation has little role to play and hence is not the focus of this study.

Using data from one AACSB-accredited university's undergraduate business program, this study addresses two research questions: (1) Do assessment results differ between the second reader approach and instructor approach? (2) If they differ, what characteristics are associated with the differences? The sample used in the study contains 456 matched cases in total. Each case has two assessment scores: one from a second reader team, and the other from the teaching instructor. The sample was further partitioned by program learning goal, course content, and teaching instructor. Our results showed that there are significant differences between second reader team scores and instructor scores in the pooled sample. When the sample was partitioned by program learning goal, we found that the differences are most pronounced for one learning goal that is more abstract in nature and involves multiple factors in its assessment. At disciplinary or course content level, the results reveal that the assessment scores between a second reader team and teaching instructors are fairly similar for a course that is quantitatively oriented. At the instructor level, we found that instructors are generally more rigorous than the second reader team and the least rigorous instructors are non-tenure track or adjunct instructors. Collectively, our results suggest that the appropriateness of using the instructor approach for the purpose of reducing assessment costs is contextual.

This study contributes to the literature by being the first to use empirical data to examine the differences (or lack of) between the instructor approach and a second reader team approach in conducting direct assessment of student learning in higher education. The findings of the study may help colleges and universities in designing their practice for the AoL assessment and conserve valuable resources. The remainder of the paper is organized as follows. Section II provides background for our study. Methodology and sample are explained in section III. Section IV presents our results, and section V summarizes the paper.

BACKGROUND

AOL has been playing an important role in higher education over the years, in spite of different views on the value created by such an assessment *movement*. While Hargreaves (1997) believes that teaching, learning, and assessment are inextricably linked and assessment is a significant motivator for learning, Astin and Antonio (2012) argue that most assessment activities add little or limited value to higher education. For various reasons, it has become an accepted fact that higher education institutions need to conduct AoL assessment. To colleges and universities, one fundamental purpose of assessment is to use the results to guide education practice, such as curriculum development and course delivery. Their motivation behind assessment may include improving student learning, fulfilling requirements by accreditation agencies, and addressing accountability.

The 2023 AACSB State of Accreditation Report does mention that institutions should use *both* direct and indirect measures in the AoL process, specifically pointing to an issue of schools not requiring and 'leveraging' indirect measures to help supplement and inform changes in their curricula and programs. While Su (2012) notes that a wider and more complete view of curriculum should include "teaching methods in addition to…content, goals, methods and assessment…but also extracurricular activities, learning environment and even hidden curriculum as well as cultures that would entail learning experiences," it is easier for business schools to insure that students have a similar learning experience by considering course content, sequencing of courses, course delivery, and learning outcomes within a particular program. This is especially true given that resources and institutional commitment to AoL initiatives can differ substantively between universities (Myers and Preiser-Houy, 2020).

As the literature of academic assessment has documented, methods used in AoL assessment include direct assessment and indirect assessment (Elbeck and Bacon, 2015). Direct Assessment refers to any method of collecting evidence that requires students to demonstrate a knowledge, skill, or behavior. In direct assessment, students have completed some work that demonstrates they have achieved a particular learning objective, and a professional makes a judgement regarding what a student learned and how well it was learned. Examples of direct evidence are papers, quizzes, exams, and projects. On the other hand, indirect assessment refers to any method of collecting evidence that requires reflection on student learning, or skills, rather than a demonstration of it. Specifically, indirect assessment uses a proxy measure, such as students' opinions about what was learned and their satisfaction, and the students themselves decide what they learned and how well it was learned. Examples of indirect evidence are teaching evaluations, surveys, and exit interviews. Prior literature finds that direct assessment is more effective and objective than indirect assessment (Luce

and Kirnan, 2016). It requires students to demonstrate knowledge and provides data that more directly measures achievement of expected outcomes when measuring students' learning against a specific learning goal. Although indirect assessment is not as accurate a measure of student learning as direct assessment, it may have benefits as an instructional tool. Therefore, indirect assessment can still be appropriate to use as a complement to direct assessment.

To implement direct assessment, colleges and universities need to consider multiple factors; for example, what to assess, how and when to assess it, and who will be the assessor. It is not the intent of this paper to address all factors related to direct assessment. Rather, this paper focuses on the "who" aspect. To conduct direct assessment, an important question to ask is who should be the "professional" to evaluate students' work and decide on their learning outcomes. Such a professional plays a key role in determining the value of assessment because their work generates assessment results, which will then be used to guide curriculum and instruction. Assessment results are of most value when they are objective and valid. Two different parties may play this key role: (a) the instructor who assigns the work to students and grades their work as part of students' course grades, and (b) other faculty members, also known as second readers, who do not teach the course from which assessment data is collected.

Each of these two parties have their advantages and disadvantages. The instructor teaching the course is presumably an expert in the subject area. They create the assignment for assessment and know the nature of the assignment well. They have already graded students' work, and hence there is little incremental cost incurred in completing the assessment practice. Course teaching instructors, however, might not be effective assessors for a number of reasons. Their prior perceptions about students might hinder their objectivity in evaluating students' achievement on a particular learning objective being assessed. In addition, their employment or contractual situation might motivate them to either over- or under-state students' performance. These two possibilities would lead to producing unreliable assessment results, which would make the entire assessment process less meaningful and even a waste of effort. On the other hand, second readers tend to be more objective. They are not the course instructor. The assessment results, either positive or negative, have little, if any at all, impact on their employment or contractual situation. The main disadvantage of second readers is that they might not have in-depth knowledge about the subject related to the assignment to expertly evaluate students' performance. By comparison to the teaching instructor approach, the second reader approach also incurs more cost.

An ideal approach to implementing direct assessment would be to have an assessor who has expert knowledge in the field, who can objectively evaluate students' learning outcomes, and the implementation is less costly. Consider the pros and cons between teaching instructors and second readers, the instructor approach meets two of the three characteristics (expert knowledge and less costly.) If evidence shows that assessment results generated by teaching instructors do not differ significantly from those generated by presumably more objective second readers, then colleges and universities could streamline their assessment practice by using instructors' evaluation.

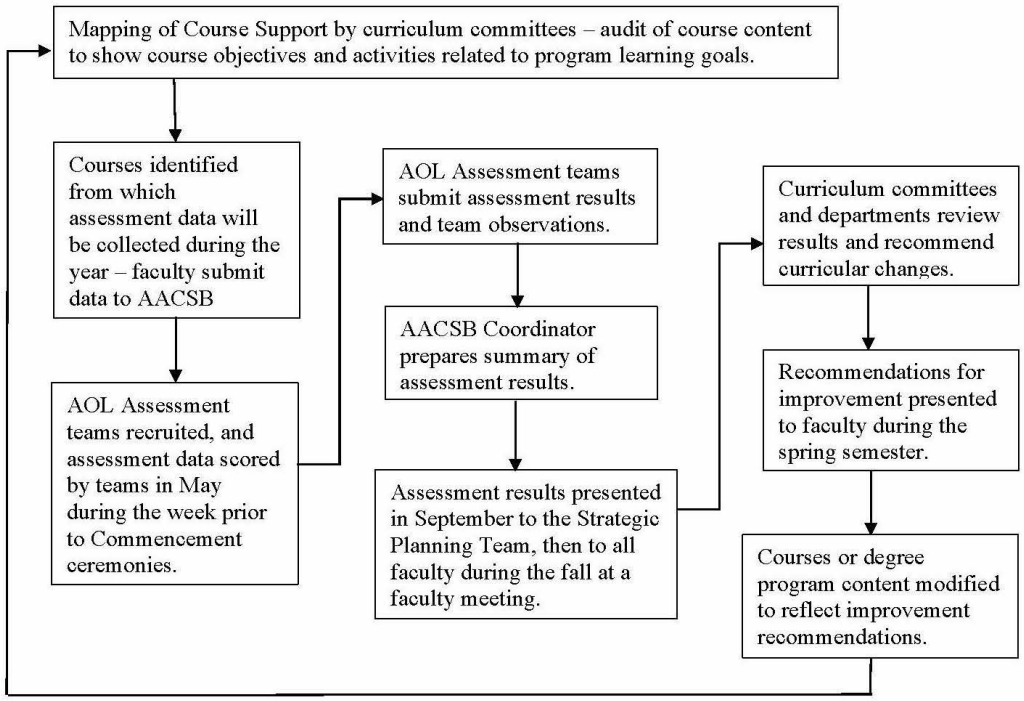
Our College of Business has been conducting AoL assessment for nearly two decades. We employ direct assessment and the second reader approach. Not surprisingly, we feel the weight of spending tremendous amounts of time, effort and financial resources on our assessment practice, especially the second reader process. Consequently, it makes us wonder if the assessment results from the instructor approach differ from those based on the second reader approach. If they are not significantly different, then we could simplify our assessment practice by using instructors' evaluations instead, which would save the cost on second readers. During one recent year, we employed both approaches in parallel as a pilot study. This paper uses the data to explore the extent of agreement (or disagreement) on assessment results generated from instructor approach and the second reader approach. If the results differ, it further examines possible characteristics that are associated with the differences. To our knowledge, this paper is the first to make these inquiries. It is our hope that the empirical findings documented in our study may benefit higher education institutions when they design or revise their assessment practice.

METHODOLOGY

The procedure to develop, monitor, evaluate, and revise the substance and delivery of courses, as well as to assess the impact of curricula in business programs is well established through a second reader model of direct assessment (Gardiner et. al, 2010). Our second reader assessment team was composed of three faculty members. During the assessment period, each member of the assessment team scored student performance *individually* based on their agreed-upon scoring rubrics. Then three members compared their scores for each student, and the *mode* of their scores was recorded as the team's assessment for that student regarding their achievement over each program learning goal being assessed in that particular year. In other words, three-member evaluations were not 'averaged,' and team

members had to discuss the rationales for their scoring until a mode was reached. AACSB does not stipulate how a school should conduct their AoL assessment. Our school developed its own assessment process based on best practices, faculty input, and our needs. The process was revised when needed. Consistent with the findings from a survey of 420 deans at AACSB-accredited business schools conducted by Kelly et. al, (2010), frequent faculty participation plays a key role in our locally-developed assessment processes. Wray et. al, (2020) document that carefully developed, internally crafted assessments may be a valid means to assess student learning. Our school has been satisfied with our assessment model, which is shown in Figure 1.

Figure 1: Assurance of Learning Assessment Process Model



During the review year, three learning goals (LGs) were assessed for the College of Business BSBA (Bachelor of Science in Business Administration) program. They are (a) LG 2: To generate, evaluate, and select alternatives consistent with standards of ethical behavior, (b) LG 6: To recognize the dynamic domestic and international factors that shape and transform the business environment, and (c) LG 7: To understand the fundamental concepts from the business disciplines in Finance and Management. In this particular review year, in addition to a second reader assessment team evaluating students' performance, the instructor for each course was also asked to evaluate their students using the *same* classification system that the second reader assessment team utilized.

The ratings provided by the instructors and second reader team are ordinally scaled over three categories: 'Fails to Meet Expectations (coded as 1),' 'Meets Expectations (coded as 2),' and 'Exceeds Expectations (coded as 3).' A Kappa statistic value that provides indication of level of agreement between raters is an ideal tool to determine the level of agreement between an instructor and the second reader team rating (McHugh, 2012). Possible values of Cohen's Kappa statistic are within the range of -1 and +1 (Cohen, 1960), although they normally fall between 0 and 1. A zero Kappa statistic value means that agreement between two raters is no better than that expected by chance, as if they had simply guessed every rating. Figure 2 below provides a list of how a Kappa statistic value might be interpreted on the positive side of the range (Landis & Koch, 1977):

Figure 2: Interpretation of Kappa Statistic Value

Kappa Statistic	Interpretation
< 0	Poor agreement
0.00 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

While the guidelines for interpretation of the Kappa statistic have been widely accepted, it should be noted that there are authors, particularly in the medical field, that argue the levels of agreement are too 'lenient' for research in health disciplines (e.g., McHugh, 2012). For our purposes, we will interpret Kappa statistics following Figure 2 above, which is the same as most studies do traditionally. Given that the instructors and the second reader team used the same classification for student performance, we consider substantial or higher levels of agreement, per a Kappa statistic value of 0.61 and above, as reasonable to expect in agreement.

As described earlier, the sample used in this study contained assessment ratings for an undergraduate degree program by both course teaching instructors and a three-member assessment team. Once the target courses to provide assessment data were chosen, the instructors were asked to provide all student work related to the learning goal within their courses. When there were resource constraints (for example, a volume of student work that exceeds the capacity of the assessment team to evaluate during the assessment period), then a random sample of student work was provided to the assessment team. In total, we collected 456 students' work from all targeted courses. The data was analyzed at four levels. First, we analyzed ratings using a pooled sample to observe if there was an overall difference between the two raters at the program level. Second, we partitioned the sample by program learning goal to find out if the program level results were driven by a particular learning goal. Third, we examined separate disciplinary course content within each learning goal to have a finer observation by content taught. Lastly, we further partitioned the sample by teaching instructor to see if a particular instructor was driving the results for a respective program learning goal or a course content. Hence, Kappa statistic values were calculated overall, for each BSBA Program Learning Goal (PLG) assessed, by course content (disciplinary content), and by instructor. The results from the pooled analysis addressed our first research question. If there was a difference, the results from the remaining partitioned samples allowed us to observe the characteristics that are associated with different ratings. Table 1 below shows our data sources in detail.

Table 1: Data Sources

Learning Goal	Course	Frequency of Students		
		Instructor	Course	PLG
PLG 2	Introduction to Business Law		56	
PLG 2	Business Ethics (Instructor 1)	24		
PLG 2	Business Ethics (Instructor 2)	40	64	
	Total for PLG 2			120
PLG 6	Intro to Business Info Systems (Instructor 1)	32		
PLG 6	Intro to Business Info Systems (Instructor 2)	40	72	
PLG 6	Principles of Marketing (Instructor 1)	40		
PLG 6	Principles of Marketing (Instructor 2)	40	80	
PLG 6	Product Development & Innovation (Instructor 1)	32		
PLG 6	Product Development & Innovation (Instructor 2)	32	64	
PLG 6	Business Strategy		40	
	Total for PLG 6			256
PLG 7	Introduction to Finance (Instructor 1)	25		
PLG 7	Introduction to Finance (Instructor 2)	15	40	
PLG 7	Management & OB (Instructor 1)	24		
PLG 7	Management & OB (Instructor 2)	16	40	
	Total for PLG 7			80
	Grand Total			**456**

RESULTS

Table 2 reports the results from pooled sample analysis. Over all 456 respondents, a Kappa statistic value was 0.16 (indicating *slight agreement*), which means low overall agreement between the two raters. Because 0.16 was below our threshold of 0.61, we considered instructor ratings and the second reader team ratings were closer to 'chance' agreement (as if agreement occurred by 'flipping a coin'). When the two raters disagreed, instructors overall were twice as likely to rate students lower than the second reader team (33.99% compared to 16.66%). These results suggest a significant difference between an instructor's rating and second reader team's rating, which answered our first research question. Our ensuing analyses were designed to shed light on the characteristics that are related to the observed difference at the program level in instructor and second reader team ratings.

Table 2: Pooled Sample Results

Observed Sample	% Instructor Rated Lower	% Second Reader Team Rated Lower	% Agreement	Kappa[a] Statistic	Significance Level
Overall (n=456)	33.99%	16.66%	49.35%	**0.16**	<.001

[a]: Numbers in bold indicate the two raters have statistically significant *slight agreement*.

Next, we examined the data by individual program learning goal, and the results are shown in Table 3. We observed improved agreement levels, from *slight* (in Table 2) to *fair agreement*, for PLG 2 and PLG 7, and a worse Kappa statistic for PLG 6. By comparison to PLG 2 (ethics) and PLG 7 (business discipline knowledge), PLG 6 (dynamic factors in business environment) is more abstract and hence probably more challenging to assess. However, *fair agreement* between the two raters was lukewarm at best. This was evident by their not so impressive percent agreement numbers, which were 51.66% and 66.25% for PLG 2 and PLG 7, respectively, and PLG 6 had the lowest percent agreement, 42.97%, between instructors and the second reader team. It appeared that the overall results reported in Table 2 were significantly influenced by PLG 6. Note that in the cases when their ratings differed, instructors rated students lower than the second reader team more often for PLG 6 (42.97% compared to 14.06%) and marginally more often for PLG 7 (20.00% compared to 13.75%). For PLG 2, instructors rated students lower as often as the second reader team.

Table 3: Results by Program Learning Goal

Observed Sample	% Instructor Rated Lower	% Second Reader Team Rated Lower	% Agreement	Kappa[a] Statistic	Significance Level
PLG 2 (n=120)	24.17%	24.17%	51.66%	**0.24**	<.001
PLG 6 (n=256)	42.97%	14.06%	42.97%	0.05	.258
PLG 7 (n=80)	20.00%	13.75%	66.25%	**0.37**	<.001

[a]: Numbers in bold indicate the two raters have statistically significant *fair agreement*.

We further analyzed the data by course content and report the results in Table 4. The results show that within each program learning goal, one course content stood out and yielded higher Kappa statistics than the Kappa value at the program learning goal level. For example, *fair agreement* for PLG 2 was driven by one course, Business Law, whose Kappa statistic (0.35) was higher than that for PLG 2 (0.24). Likewise, for PLG 7, there was *substantial agreement* between instructors and the second reader team in the Finance course, whose Kappa statistic (0.63) was much higher than that for PLG 7 (0.37). As for PLG 6, which had low Kappa statistics (0.05) in Table 3, our disaggregated analysis revealed that the Marketing course actually reported significant *slight agreement* with a Kappa value of 0.17. In all other cases, Kappa statistic values indicated very low agreement, and even some *disagreement* (Kappa statistic -0.15) within the capstone Business Strategy course between the instructor and the second reader team, although all scores were statistically insignificant. According to McHugh (2012), "A negative Kappa statistic represents *agreement worse than expected*, or *disagreement*. Low negative values (0 to −0.10) may generally be interpreted as 'no agreement'. A large negative Kappa statistic represents great disagreement among raters." Similarly, when the two ratings were not the same, instructors tended to rate student performance lower than the second reader team for six out of the eight courses. Note that the Finance course is the only quantitatively-oriented course. Results reported in Table 4 seem to suggest that the two raters are more likely to agree on student performance in a quantitative course.

Table 4: Results by Course Content

Observed Samples	% Instructor Rated Lower	% Second Reader Team Rated Lower	% Agreement	Kappa[a] Statistic	Significance Level
(PLG 2) Business Law (n=56)	21.43%	21.43%	57.14%	**0.35**	<.001
(PLG 2) Business Ethics (n=64)	26.56%	26.56%	46.88%	0.11	.246
(PLG 6) Business Information Systems (n=72)	54.16%	4.17%	41.67%	0.06	.381
(PLG 6) Marketing (n=80)	32.5%	20.00%	47.50%	**0.17**	.035
(PLG 6) Product Development and Innovation (n=64)	32.82%	18.75%	48.43%	0.08	.466
(PLG 6) Business Strategy (n=40)	60.00%	12.50%	27.50%	-0.15	.131
(PLG 7) Finance (n=40)	12.50%	5.00%	82.50%	**0.64**	<.001
(PLG 7) Management (n=40)	27.50%	22.50%	50.00%	0.07	.598

[a]: Numbers in bold indicate the agreement level between the two raters is statistically significant.

Lastly, we examined the data at the instructor level, and the results are reported in Table 5. Out of the fourteen Kappa statistic values, only five of them were statistically significant. Instructor 2 for Marketing had *slight agreement* with the second reader team on student performance. The instructors for Business Law and the second Business Ethics class managed *fair agreement* with the second reader team. Lastly, Instructor 1 for Finance had *substantial agreement* with the second reader team, while instructor 2 for the course had *moderate agreement.*

Table 5: Results by Instructor

Observed Samples	% Instructor Rated Lower	% Second Reader Team Rated Lower	% Agreement	Kappa[a] Statistic	Significance Level
(PLG 2) Business Law (n=56)	21.43%	21.43%	57.14%	**0.35**	<.001
(PLG 2) Business Ethics (Instructor 1) (n=24)	8.33%	54.17%	37.50%	0.03	.820
(PLG 2) Business Ethics (Instructor 2) (n=40)	37.50%	10.00%	52.50%	**0.22**	.044
(PLG 6) Business Info Systems (Instructor 1) (n=32)	25.00%	9.38%	65.62%	0.14	.242
(PLG 6) Business Info Systems (Instructor 2) (n=40)	77.50%	0.00%	22.50%	0.03	.592
(PLG 6) Marketing (Instructor 1) (n=40)	20.00%	32.50%	47.50%	0.09	.381
(PLG 6) Marketing (Instructor 2) (n=40)	45.00%	7.50%	47.50%	**0.17**	.040
(PLG 6) Product Development & Innovation (Instructor 1) (n=32)	53.13%	0.00%	46.87%	0.13	.234
(PLG 6) Product Development & Innovation (Instructor 2) (n=32)	12.50%	37.50%	50.00%	0.06	.706
(PLG 6) Business Strategy (n=40)	60.00%	12.50%	27.50%	-0.15	.131
(PLG 7) Finance (Instructor 1) (n=25)	8.00%	4.00%	88.00%	**0.75**	<.001
(PLG 7) Finance (Instructor 2) (n=15)	20.00%	6.67%	73.33%	**0.46**	.022
(PLG 7) Management (Instructor 1) (n=24)	12.50%	33.33%	54.17%	0.17	.309
(PLG 7) Management (Instructor 2) (n=16)	50.00%	6.25%	43.75%	0.04	.823

[a]: Numbers in bold indicate the agreement level between the two raters is statistically significant.

The examination of *percent rated lower* numbers in Table 5 showed that instructors in general (nine out of fourteen instructors) rated student performance lower than the second reader team. Of the four instructors who rated students

higher than the second reader team, the most dramatic differences were by faculty members who were either an adjunct instructor from the Arts and Sciences College (Business Ethics, instructor 1), or a College of Business professional educator who was on a 3-year contract (Product Development, instructor 2). Overall, *instructors* appear to rate their students more rigorously relative to the second reader team, and where the opposite was observed, the least rigorous instructors were faculty who were not on tenure track. Intuitively, one might presume that second readers would judge student performance more rigorously than instructors, because second readers are deemed to be more objective and bear no consequence for the assessment results. Our results, however, do not support this presumption. We found that instructors are more rigorous for two out of the three learnings goals, in six out of the eight courses, and for nine out of the fourteen instructors.

We also calculated 95% confidence intervals for the two highest Kappa statistics reported in Table 5 and yielded intervals of (0.881; 0.609) and (0.837; -0.081). Thus 95% of the agreement between Instructor 1 for the Finance course and the second reader team ranged between 0.881 (almost *perfect* agreement) to 0.609 (*substantial* agreement), and 95% of the agreement between Instructor 2 for the same course and the second reader team ranged between 0.837 (almost *perfect* agreement) to -0.081 (*slight* disagreement). It should be noted that Instructor 2 had only 15 students, which is a small sample for an interrater reliability analysis.

One possibility for high agreement between the instructor and the second reader team is that a faculty volunteer for the second reader team is also the instructor for an assessed course. This was not the case in this study. Both instructors for Finance only provided assessment materials and did not serve on the second reader team. Therefore, we are confident that the instructor and the second reader team each assessed student performance independently and reached substantial agreement.

SUMMARY AND CONCLUSIONS

This study compares AoL direct assessment results generated by course teaching instructors and a separate assessment team using empirical data from one university for the purpose of finding areas of resource conservation. In ~~a~~ direct assessment, a professional reviews direct evidence of student work and judges student performance. This role of "professional" may be played by the instructor who gives and grades the assignment for course teaching purposes, or by another party who does not teach the course (i.e., a second reader.) There are trade-offs for each approach. From the perspective of cost savings, one would favor the teaching instructor approach, especially if the assessment results between instructor and second reader team do not differ significantly. The purpose of this study is to find out (a) if the assessment results from the two "professionals" differ, and (b) what factors contribute to the difference.

We use an interrater reliability analysis (Kappa statistic) to determine the level of agreement between instructors and a second reader team. Our analyses are conducted at four levels: pooled sample, partitioned sample by program learning goal, further partitioned sample by course content, and finally partitioned by instructor. The pooled sample results show that the agreement level is very low (*slight agreement*.) When the data is analyzed by program learning goal, two out of the three learning goals show improved *fair agreement* level, but still not satisfactory. The results also show that the learning goal that is more abstract in nature and involves multiple factors has the lowest level of agreement. This has implications for both direct and indirect assessment. There has been an increase in calls for measuring student abilities through open-ended responses (such as analysis, synthesis, problem solving, motivation, engagement, involvement, and deep 'meaningful' learning) over responses to more structured measures of learning (such as memorized terms, calculations, and exam scores on multiple choice tests) (Adamiec et. al, 2020; Porter and Dottin, 2020). At the course content level, we learned that a course that is quantitatively oriented (Finance) or has a more clearly defined premise and structure (Business Law) tends to have a higher agreement level, *substantial agreement* and *fair agreement*, respectively. In at least one study (Kumar et. al, 2018), the authors found that course-embedded assessments and associated assignments that align with program-level learning goals over more qualitative material were successfully developed with high interrater percentages (rather than Kappa scores) of agreement between two course instructors and second readers. In their study, however, the rubric was shared with students in advance, which could affect both student responses to the written prompts as well as instructor emphasis in explaining the requirements of the assignments. In our study, only the instructor and the second reader team were provided with the rubric with which to score student responses to prompts (instructors were not required to share assessment rubrics with students). It appears that in the areas of both incorporating indirect assessment and using direct assessment for more abstract concepts within business, more research is needed to identify reasons for low agreement between instructors and second reader teams on student performance.

The innovation of conserving resources devoted to AoL initiatives by identifying courses where assessment teams provided limited value due to the courses having more quantified content or clearly defined premise or structure may also play into current interest in the use of Artificial Intelligence (AI) tools to assist in assessing student performance. However, Aloisi (2023) argues that there are still unresolved issues in AI that until addressed may compromise AI interpretations and subsequent uses of student performance results, even for seemingly 'objective' close-ended questions such as multiple choice and true/false questions. These issues center around unreliability, low explainability, and bias still inherent in even the most developed AI systems. Additionally, Aloisi theorizes that AI issues in assessing student performance when those assessments can have significant consequences (such as affecting admissions into universities or by extension graduate programs) can affect trust in the overall assessment system itself. While Aloisi's article addressed a standardized exam system in the UK, such assessment systems seek to "…ensure that the information they provide about a student's knowledge and skills is useful: understandable by all stakeholders and comparable over time and across locations," which is not dissimilar to goals inherent within assurance of learning. We may not be seeking public trust as in the case of standardized testing in the UK, but we do need faculty trust in the system that we develop to assure that our students are learning significant concepts in our programs.

Our study is the first to explore the difference (or lack of) in assessment results between multiple instructors and a second reader team using empirical data over a wide range of business content areas. Collectively, our findings suggest that these two raters do not agree with each other much, except for program learning goals assessed in two quantitative courses. Therefore, one cannot conclude that colleges and universities can do away with a second reader and just use instructors as judging professionals. It may be, however, beneficial to consider a hybrid approach: use instructor's rating for quantitative courses or well-structured courses and use a second reader team for the rest. Moreover, this study also provides evidence that instructors tend to be as or more demanding of students in their perception of what the student has learned than a second reader team. Such evidence does question the *added value* of having a second reader team that in general rates students similarly to instructors or with less demanding criteria.

The results from this study are based on data collected from one university, which might affect the generalizability of its findings. For this reason, it has implications for future research. As an example, the timing of our assessment, after final grades due and before commencement, might induce second reader team members' grading fatigue. Future research can experiment with different assessment timings. In addition, our second reader team members are volunteers that come from all business disciplines. Future research may consider selecting discipline-specific second reader(s) to match with the discipline of assessment data. Moreover, this study found instructors are generally more rigorous than second readers, and future research may want to explore the causes of it. Lastly, we pride ourselves as a private university with small class sizes, which inherently limits our sample size. More studies with larger data sets are needed to draw definite conclusions.

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Design Thinking in the University and the Business Classroom: A Collaborative Search for Solutions

Peter Kaufman, Nathan Hartman, Rick Valentin, Gina L. Hunter, Jim Jones, Maria Luisa Zamudio, Becky LaMont
Illinois State University, Normal, Illinois, USA
Ken Baldauf, Florida State University, Tallahassee, Florida, USA.

ABSTRACT

Design Thinking is a popular tool for problem solving and innovation in business organizations yet is less often used by university decision makers. While advances in artificial intelligence and automation underscore the critical need for problem-solving, collaboration, and creativity in the labor market, colleges struggle to keep up with and prepare students at the intense pace of change. Much of the research on the use of Design Thinking focuses on how to implement its methods on a small scale, such as within a single project or a class. This paper describes a macro-level, detailed change management approach taken by one public university to introduce Design Thinking broadly and to garner support for it from university and college of business administrators down to faculty and students. This approach generated broad, sustainable institutional and college support paving the way for continuous design thinking applications for university-wide and course-based problem solving and innovation.

Keywords: Design Thinking, business education, university administration, change management, collaboration

INTRODUCTION

Following the Association to Advance Collegiate Schools of Business (AACSB's) mission, American colleges of business aim "to foster engagement, accelerate innovation, and amplify impact in business education" and "to transform business education globally for positive impact" (AACSB). Delivering on these goals requires preparing students, as well as their faculty and college administrators, for a rapidly changing environment. Design Thinking (DT) is a popular methodology for problem-solving and innovation that could help universities adapt. Yet, based on our first-hand experience, faculty and university leaders are more likely encourage students and professionals to use DT than to take the training themselves and use it to solve problems relevant to university operations. Advocating for DT is often not enough for administrators to utilize the problem-solving framework themselves. The optimism and research they advertise to students during workshops and classes seem to make them immune to its practical usefulness.

Despite the increasing use of DT methodologies within public, private, and social organizations and the identified need for graduating individuals who can collaborate and solve complex problems, the adoption of DT in colleges of business and higher education remains scant by the administrators themselves. Much of the academic research related to DT focuses on how to implement its methods on a small scale, such as in a single project or class, rather than by decision makers in the colleges. This paper takes a different approach. Here we provide a roadmap of how Illinois State University's (ISU) faculty, administration, and staff are trained to use DT beyond the classroom.

Our central argument is that administrators must experience DT as participants in order to use it in a professional context. Through the experience, administrators can see DT as a way of dealing with the complex and rapidly changing higher education environment they face. DT improves outcomes because it emphasizes delaying the general tendency to solve problems by seeking a resource-efficient solution. Instead, practitioners first aim to understand the needs of the people facing the problem. Next, they seek feedback to prototypical solutions and move to implementation only after feedback indicates the solution has the viability for success. In this paper, we show how a college of business, situated within ISU, worked together using DT to share resources and provide solutions.

This paper is organized as follows. First, we briefly explain what DT is and why it is important for business students learn to use and be able to apply it in their professional careers. Second, we discuss how DT has been presented in higher education and outline one institution's efforts to efficiently introduce DT through a university-wide workshop faculty-student training model in the same way DT is presented to students in a capstone undergraduate business class. Participant feedback from both venues is provided. Both DT workshops at ISU and college of business levels and the

inclusion of DT in a business class call upon participants to carry the momentum of the session into future practical contexts. We conclude by providing insights on how a university or college of business can introduce DT as more than an interesting classroom exercise.

WHY DESIGN THINKING IS IMPORTANT

The DT process was introduced as a five-step human centered process: empathize, define, ideate, prototype, and test (Simon, 1969). Today, DT is often presented as a four-stage process – also called the 'Double Diamond' proposed by the UK Design Council (2007)-- or the popular five-stage model of the Hasso Plattner Institute of Design at Stanford University (d.school) (2010). Similar human centered and iterative formats encourage participants to achieve user-friendly solutions through collaboration intensive iterations (Brown, 2008). These stages or models provide steps to guide participants through a creative problem-solving process.

One of the most frequently cited definitions of Design Thinking is: "A discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity." (Brown, 2008, p. 2). As a result, DT is often thought of as a problem-solving methodology where users are empowered to uncover new solutions to a given problem. Its non-discipline-specific vocabulary and qualitative emphasis are inclusive and geared for human collaboration.

DT as a practice began in the field of product design, and because of its utility, it has found its way into the innovation groups of a wide variety of organizations; yet its application outside of the classroom at colleges of business is surprisingly minimal despite its powerful user (or human) centered approach. DT is promoted as an important tool educated people should use to solve complex problems in a world filled with increasingly complex social, cultural, technical, and environmental problems. HSB Online notes that, "As of December 2021, the most common occupations requiring design thinking skills were: marketing managers, executives, industrial engineers, graphic designers, software developers, general and operations managers, management analysts, personal service managers, architectural and engineering managers, and computer and information systems managers." University faculty, administrators, and staff are a striking omission from this list. Clearly, universities are complex organizations in need of the human-centered innovation and problem-solving that DT affords.

CURRENT & FUTURE SKILLS

Increasingly, college graduates are expected to be capable of solving complex problems that, by definition, present significant levels of ambiguity and require them to collaborate effectively with diverse others to identify novel solutions. DT is a promising methodology educators should continue to more widely embrace in the classroom and beyond.

The OECD (Organisation for Economic Co-operation and Development) in their *Future of Education and Skills Education 2030* project, draws attention to the need for new thinking to achieve new solutions to various challenges in a rapidly changing world. They cite climate change and depletion of natural resources in addition to rapid disruptive waves of change in every sector impacting the economic stability of people world-wide. As a result of these challenges, decision makers in universities will need to lead the charge by operating their institutions and curriculum in ways that allow themselves and students to play an integral part of addressing the world's wicked problems. Specifically, the *OECD Education 2030* project has identified three categories of "Transformative Competencies", that together address the growing need for higher education to do better at developing college students who are innovative, responsible, and aware.

To prepare for 2030, people should be able to think creatively, develop new products and services, new jobs, new processes and methods, new ways of thinking and living, new enterprises, new sectors, new business models and new social models. Increasingly, innovation springs not from individuals thinking and working alone, but through cooperation and collaboration with others to draw on existing knowledge to create new knowledge. The constructs that underpin the competency include adaptability, creativity, curiosity, and open-mindedness. (OECD 2018, p. 5)
The OECD report also specifically cites the role of DT. "Some procedural knowledge is domain-specific, some transferable across domains. It typically develops through practical problem-solving, such as through design thinking and systems thinking" (p. 5).

Similarly, the World Economic Forum cites problem-solving and creativity among the top five skills in demand for

2025 (World Economic Forum, 2020). These skills focus decisions makers using the best tools to extend beyond the same old thinking, because it leads to the same old results, particularly when implementing new technologies (Binkley et al., 2012; Lemke, 2002).

Given that DT has expanded beyond its initial narrow use in product design, and people seeking education need to know the tools used to transform industry in a collaborative fashion, DT should also be utilized by their colleges of business and higher education more broadly.

CURRENT DESIGN THINKING USE IN HIGHER EDUCATION

As Design Thinking is increasingly used in the business landscape, universities attempt to keep apace by teaching and supporting multidisciplinary approaches to solving problems (Dunne and Martin, 2006; Vaugh, Finnegan- Kessie, White, Baker, & Valencia, 2022). Design Thinking emerged as a topic when many people started applying design methodology to problems that needed creative and critical thinking skills to solve complex problems that had not in the past presented themselves as design problems (de Waal & Maritz, 2022). As a result, DT is frequently taught in business, engineering, and design schools. The first two schools of Design Thinking were the d.school at Stanford University and the D-School of the Hasso-Plattner-Institute. These institutions educate students from different disciplines to collaborate to solve complex problems in a human-centered approach. Often, courses are co-taught by professors from two different disciplines and attract students from various disciplines across the university (Wrigley & Straker 2015, p. 3).

To better understand the use of DT in the curricula, Wrigley and Straker (2015) completed research on what content DT courses taught, and how it was taught, via assessment and learning modes. They identified five themes: (i) theories, methods and philosophies providing the foundation of DT as a method, (ii) a product focus emphasizing new product development and a human centered end user focused approach, (iii) design management taking a broader view of the product and non-product specifics, (iv) business management focused on innovation and strategy and (v) professional development that seeks to create leaders who value DT. Each of these themes is discussed in greater detail in their article (Wrigley & Straker 2015, p. 4).

The five themes offered by Wrigley and Straker (2015) provide the topics, assessment practices, and teaching modes used in the teaching of Design Thinking. These themes significantly indicate a clear progression in DT knowledge from factual (knowledge comprehension), conceptual (apply), conceptual (analyze), procedural (synthesis), and metacognitive (evaluation) (Wrigley & Straker 2015, p. 6). In a separate study using a four-school mixed methods design comprised of faculty and student surveys with interviews, DT was found to help generate trust across collaborators, foster the motivation needed to sustain problem-solving efforts, and increase the quality of solutions developed (McLaughlin, Chen, Lake, Guo, Skywark, Chernik, & Liu, 2022). Results from this study demonstrated the validity of DT across disciplines and universities, the ways in which DT practices and outcomes are experienced in higher education, and many essential differences between DT practices within higher education and other sectors (McLaughlin et al. 2022).

Consistent with other research, a longitudinal study using 910 novice DT university students from different disciplines who worked in teams showed significant improvement on students' problem solving and creativity skills after solving a short case study (Guaman-Quintanilla, Everaert, Chiluiza, & Valcke, 2022). Other supportive results come from a recent DT review which revealed the following skills were enhanced by DT in an educational environment: collaboration/teamwork, creativity, problem solving, and empathy (Guaman-Quintanilla et al., 2018). In short, the effects DT classes have on students are very positive. Notably, students regularly report they expect DT will have profound impacts on their whole lives (cf. Plattner, Meinel, & Weinberg, 2009; Meinel, Weinberg, & Krohn, 2015). Statements of positive changes of their self-image, personal habits, workstyles, and career preferences are other more immediate impacts reported by students. There appears to be a sharp contrast to other classes which students take and quickly forget (Thienen, Royalty, & Meinel 2017, p. 313). Given this, it is surprising that DT is not more widespread in colleges of business.

Academic research on DT use in education has largely focused on the benefits DT offers, and how one could include the DT framework as a project not specific to a major (Chamberlain & Mendoza, 2017) or how to integrate it into a particular discipline (Zarzosa 2022). Little academic research has focused on how DT can be introduced at a college or university level with an emphasis on change management at the institution. Given the high value skills that DT cultivates in participants, it is important to know more about how DT can be more readily introduced and more broadly

used in a higher education environment.

OBSTACLES TO DESIGN THINKING USE IN COLLEGES OF BUSINESS AND HIGHER EDUCATION

Despite the many positive aspects of DT and the future need for business students with the skills DT provides as enumerated earlier in this paper, outside of some exceptions, colleges of business have been slow to adopt DT in their curriculum. Given how interdisciplinary DT is, the siloed nature of higher education may be one reason for resistance, but faculty concerns about perfection and having the "right answer," and an overall resistance to change commonly found in many large institutions are also relevant factors.

The following statement underscores the cultural impediment to using DT in an academic setting: "Either way, Design Thinking is an odd fit with academe in some respects. In DT, the experts are the end users, not the scholars sitting on decades of research. Emotion can outweigh intellect. A fast, cheap stab may lead to a better outcome than an expensive, fussed-over pilot program. Screwups are to be taken in stride, not minimized in embarrassment" (Gardner, 2017, p 1). Consistent with this, literature shows that the educators' role in design thinking is to be perceived as a facilitator, rather than an instructor (Scheer et al., 2012).

Perhaps unsurprisingly, very often it is the academic discipline rather than a problem by itself, which suggests unvarying solutions. "Different academic disciplines promote different analyses and solutions. For instance, when there is a problem situation because a youngster robbed an old man underneath a bridge, a psychologist might focus on the youngster's mindset while an architect notices bad lighting conditions under the bridge" (Thienen, Royalty, & Meinel 2017, p. 318-319). To avoid a narrow disciplinary lens, DT emphasizes exploration of the problem and solution space at the outset before a team decides on one point of view. According to Thienen et al. (2017, p. 319), "Multidisciplinary collaboration could help teams overcome cognitive automatisms, which predetermine how a problem is framed and what kind of solution is considered."

CASE STUDY: BROAD INTRODUCTION OF DESIGN THINKING AT ILLINOIS STATE UNIVERSITY

Setting-Up University-Wide Design Thinking Workshops

Illinois State University (ISU) had a few isolated practitioners of DT on campus prior to this initiative. As a general tenet of introducing something new in an organization, these practitioners conceived a way to correct the institution's immunity to practicing what it taught. First, they raised awareness of DT as a tool for finding innovative solutions from the users' perspective in a broad way across ISU. A workshop model was developed to draw multiple stakeholder groups into the process and train them on DT. Experiencing the DT process in relation to their jobs running the university was a way to prepare participants to extend the practice beyond their faculty's classroom. A faculty member and change agent at ISU utilized an expert, the director of a Design Thinking center at a large public southern university and a respected faculty member, as a resource and facilitator of the workshop. The expert, having previously launched an innovation hub at his university and successfully taught DT to students and professionals, easily built credibility with administrators, staff, and faculty. This DT expert and his mentor from a professional services firm known for its DT expertise at a professional consultancy, were invited to facilitate the first DT workshop at ISU with the goal of "teaching the teacher" as a way to allow participants to extend the practice through the institution.

After running a short DT workshop in a spring semester, a small group of faculty/staff at ISU strategized and decided to run two more workshops in the summer. Links to workshop landing pages with information is provided below along with examples of artifacts from these workshops is available in this paper and additional materials for turn-key use in a class or workshop format are available from the first author. Students were not the primary focus for the workshops as the main goal was to gain buy-in from faculty who would have interest in using DT in their classes and to garner upper administration ISU support for DT's use on institutional problems.

Some students were included in the workshops to gain their feedback and prove enthusiasm participant develop toward the application of DT on real issues in education to faculty participants and administration. Academic leaders from across campus were invited to the end of each workshop to enable faculty to showcase what they had learned and to "sell" DT. Funding for these three workshops came from three entities at ISU: the university's Provost's Office, the College of Business, and one unit known for innovation within the College of Business.

It is important to highlight that the external facilitator was tasked with building the competency of faculty to become future facilitators of the DT process themselves. In addition, a select group of ISU faculty/staff passionate about

introducing DT to the university community were selected for the initiative. This group of faculty/staff played a key role in building awareness for the workshops encouraging participants from across levels of ISU to attend, identify funding for the workshops, and help to determine the duration, timing, and the number of workshops that would be offered. At the end of each workshop, there was time allocated for teams to "present" their design solutions to guests. The guests were university personnel typically in charge of departments, colleges, or from the university Provost's Office. This afforded an additional opportunity to demonstrate the framework's value and further build buy-in.[1]

Those interested replicating this implementation will find an agenda from one of the workshops at: https://www.designminded.me/isu#overview-5 and artifacts from one of the online workshops are featured in Figures 1-4 (Plan, Empathize, Ideate, and Prototype). These artifacts represent only a few of the "tools" that are available for the various DT stages. It is important to point out that DT can be taught over varying durations in workshop, classroom, and other formats. One can run a one-hour, three-hour, full day, multi- day, or full semester DT course depending on the depth and breadth of goals. When providing training from an adoption perspective, it is important to keep in mind that a very long training workshop may signal to potential participants that DT is very cumbersome and hard to use in an existing course. Keeping the workshop shorter communicates that use of DT in a single class or parts of various classes is more feasible for adoption for solving institutional problems. For purposes of illustration, a few selected artifacts for one team that participated in an online DT workshop are presented in sequential order in Figures 1-4. Given more time and resources, the professionals could more fully develop and test their solution. Details on a turn-key step-by-step presentation and material list available from the authors is described later in this document. Additionally, several guides for hands-on Design Thinking exercises for college students are available. Foster (2021) is recent and an easy to follow guide for interested faculty to follow and implement in their classes.

Outline and Content of the Initial Workshops

Although the primary goal of the workshops was to educate participants on the DT process, each workshop had a Design Challenge. In DT, these are framed as "How Might We" (HMW) questions. The process of identifying and refining each HMW statement took workshop facilitators and organizers a significant amount of time in advance of the workshop. The Challenge is very important as it needs to be engaging for all participants and specific enough to generate potentially valuable insights on an important topic. The shorter the DT workshop, the less emphasis on the results of the challenge and greater emphasis on the process of learning DT. The longer the workshop (or even a full semester DT class), the greater the learning of DT process *and* insights gleaned on the Design Challenge. Examples of Design Challenges used at two of the workshops were:

1. "How might we increase and improve ISU's strategic partnerships with organizations to the benefit of students, ISU and the community?"
2. "How might we strengthen ISU's relationships with regional high schools to smooth students' transition into a successful college life?"

Both challenges were relevant to a broad constituency across ISU. For each challenge, facilitators identified and invited a diverse range of individuals who might have interest or insight in the topic at hand.

At the start of each workshop, facilitators introduced DT generally—since prior knowledge was not guaranteed. They also introduced the Design Challenge and HMW question. Then participant teams engaged in various stages of DT. For instance, Figure 1 (Plan) which addressed Design Challenge #2 participants collaborated to understand who is impacted by the challenge and trends impacting the challenge.

For the empathy exercise (see Figure 2) of this workshop, participants were given the opportunity to ask questions of the head of strategic partnership at ISU along with the head of a county chamber of commerce. Following this, they placed individual insights pursuant to the Design Challenge onto a post-it note (one insight per note) which was then placed on a team "board". Themes were identified and insights were grouped. Stakeholder and context maps were used to help the team further understand the issue and home in on a specific target (e.g., student type).

Following these steps, the team then reframed the Design Challenge around a specific user (first generation college student or transfer students) or sub-part of the issue while remaining consistent with the original Design Challenge. In the ideation stage, teams used various ideation or brainstorming techniques to come up with potential solutions. We provide two examples in Figure 3: A to Z and Brand Hijack. The A to Z exercise asks teams to develop solutions that start with each letter of the alphabet. The Brand Hijack exercise asks teams to develop a solution as if they were taken over by a particular brand. Following ideation, each team was asked to develop a conceptual prototype in the

form of a storyboard showing how the solution would work (see Figure 4). Upon completion, each team explained their prototype solution to the larger group. If time and resources permit, they can further develop this prototype and test it with users, revising as they gain feedback.

Feedback on Workshop Model

To gain feedback on our second DT workshop, we conducted a short anonymous survey with participants. Six faculty, staff, and administrators completed the survey. Figure 5 shows comments to four questions. As can be seen, participants generally valued how engaging the workshop was for teaching and beyond, how important it was to help develop student critical thinking, how inclusive it was, and the structured approach to innovation. Clearly some were seeing how a tool taught to students would be valuable to themselves and the institution when also applied outside of the classroom. Feedback also encouraged the facilitator at the external institution to develop a more simplified DT image or "wheel" which is shown below and in more detail in Figure 6. A link to the website with this extensive set of "tools" is freely available at Design Minded (Designminded.me). One of the challenges but also a strength of using DT, is its breadth. Depending on the workshop goals, the more time one has for the DT process the more tools for each stage of DT can be used.

Strategizing Sustainable Support

Following the initial training workshops, a core group of DT advocates continued to strategize on how best to move forward with DT at ISU. A Dean at one of the colleges presented some ideas to leaders in the Provost's Office. Then, several months into the next academic year, Academic Affairs at the institution requested a three-hour DT workshop for professional development in which about fifty people in leadership roles across the institution attended (for more on this workshop See "ISU Academic Affairs -Design Minded" (https://designminded.me/isu-aa) This workshop was run in a face-to-face format by the external academic facilitator and received very positive feedback. To show broad support at the faculty/staff level, faculty, and staff from across the institution who were supportive of DT and had participated in the previous DT workshops, were also in attendance.

Given these positive outcomes, continued financial support for DT workshops has been provided by ISU's Office of Research and by a Centers for Entrepreneurship and Risk Management, both housed in the College of Business. Additional DT workshops include three for the College of Business and two for the university at large. Topics ranged from how to encourage undergraduates to pursue research (University) to how can the COB build a closer relationship with the community Chamber of Commerce (COB). Having ongoing workshops maintains awareness of the value of DT in the university and College of Business. Several facilitators from ISU led these workshops.

Institutionalizing DT through the Curriculum

Another avenue for sustainable DT growth at ISU has been through curricular design. The hands-on activity of DT reinforces to students the merits of DT, but also the energy emanating from students and professional development workshops spreads across the institution encouraging administrators to continue to see DT as practical and viable tool. One faculty member, and co-author of this paper, who became proficient in DT through the three-hour workshops, applied DT in three design exercises in his capstone (senior level), in-person undergraduate marketing course.[2] The content was taught in three successive seventy-five minute classes fully dedicated to a specific design "sprint" or challenge. As students progressed through the sprint, the assignment required students to photo document their teamwork, and craft a short narrative of their final proposed solution (conceptual prototype) to the posed design challenge which was: "*Given the rapid changes in the employment market, how might we help the COB to more closely partner with the local business community to help students to gain skills/experience to thrive?"*

Student response to DT in the class was excellent. Feedback on DT was collected at the end of the third class dedicated to the design challenge. Students in the course anonymously responded to five questions, rating the questions from 1 (least positive) to 7 (most positive) scale. Results from twenty-eight student responses follows each question: "How important is complex problem solving to your career?" (6.6); "How important is effective collaboration between team members?" (6.4); "How personally interesting was the DT material relative to other assignments/projects?" (5.9); and "How useful was the DT material at addressing the stated design challenge relative to other approaches?" (5.9). Students were also asked "Should we include DT in future classes?" to which the responses were unanimously, "yes". Finally, students were asked an open-ended question about what they would change about DT Design challenge. Student replies can be found in Figure 7. As average responses and written comments show, students were strongly in favor of the use of DT in a business class.

CONCLUSION

As mentioned previously, AACSB's mission and vision are to foster engagement and innovation for business education to have a positive impact globally. Introducing DT is one effective and efficient framework in which to realize this but in the university setting it needs to be more widely adopted outside the business faculty's classroom. On a practical level, as mentioned previously, one of the co-authors has successfully used delivered DT in several workshops with college of business staff and faculty in much the same way it is delivered in a capstone course. College of business faculty were offered the chance to utilize the tool offered within their curriculum to transform the institution itself. Course turn-key materials were developed and available as free resource on many university websites (e.g., DT@ISU – Design Thinking at Illinois State University (https://creativetech.dev/dtatisu). The website has examples of DT use in higher education and, most importantly, curated easy-to-use "tools" based on the phases of DT. The presence of a website bolstered the credibility of the DT initiative and communicated the message that DT can be used by students and professionals as well as ISU and in the College of Business decision makers seeking innovative solutions in their processes.

On a macro level, each institution has its own unique strategy, goals, and culture which may differ from the case study at hand. However, institutions seeking to pursue a similar path to the one discussed in this paper may benefit from the following recommendations which can be employed at various levels within the institution (e.g., university-wide, college-level, classroom, etc.).

First, one cannot underestimate the role of momentum and building a series of success stories or "wins". It is important to identify a small (e.g., 4-7) teams of faculty, staff, and administrators, ideally from different academic areas, that share a similar strong motivation to introduce DT at the college or university and ideally have strong social capital and resources. Drawing on theory, these are "institutional entrepreneurs." Tying to theory, asking the college's decision makers to use DT is more legitimate if its adoption is tied to existing organizational values and goals. As such, the institution's mission and vision and strategic plan should be consulted to identify how DT aligns with established values and pillars. Building too large a team at the outset will slow the process. Although it is tempting to include "everyone," the process could fail due to inaction and social loafing. Intentionally cultivating relationships across the university at all levels and identifying a second layer of faculty/staff support who will also advocate for DT is essential. This second layer can capture additional influencers that can lend support and identify "resistors" or defenders of the old structure. Borrowing from organizational theory, within the university context it has been suggested that change agents can embed new practices within a community of practice which then act a test field from which the change process can advance. The smaller initial core group combined with the second larger group of DT advocates represents this community of practice. One valuable aspect of all the workshops was that even if participants did not "solve" the Design Challenge ("wicked" problem), participants from across the campus and community had the opportunity to learn about DT and to talk and interact, which creates a more connected community.

Second, after the initial awareness building workshops we found it crucial to identify small-scale funding to introduce one three-hour workshop to signal to potential participants that including DT in a course (versus creating an entire new course) is feasible. This short workshop included a step-by-step lesson plan (including all materials needed) for easier replication and guidance on how to introduce a broader set of DT "tools" after confidence is built. Characteristics of DT is its breadth, multi-step process, heavy post-it and poster/white-board usage, which, for those unfamiliar with it, can appear difficult to learn and use in a culture of higher education where the faculty are the "experts." That said, having success with a shorter workshop is important to advocate for additional workshops. As mentioned, this may be challenging due to the interdisciplinary nature of DT which may not reside in a single department or college or school which is typically the main institutionalized conduit for funding. However, this snowball effect of visibility and valuing DT across ISU trickles to the College of Business. Immunity to utilizing what the faculty teach is a strange phenomenon, but in this case of our experience the College of Business stakeholders can be influenced to take their own medicine. The continuous flow of design challenges within the college signals the need to let go of the reliance on less optimal problem-solving frameworks and adopt a more suitable approach. Financial resources are useful to support additional workshops to build even more advocates and enlarge the community of practitioners within the college.

Third, identifying an excellent DT workshop facilitator is another crucial component of strategy and it is suggested that faculty first be encouraged to embed DT into classes that are most conducive to the DT process with the harder change, such as embedding DT into multiple sections of general education or capstone courses, best reserved after greater wide-spread campus acceptance due to required extensive resources and likely slow pace of curriculum

changes. As faculty interact with administrators within the college, instructors will want to align the advocated behavior in the classroom with the approaches used during their service within the college.

Lastly, keeping college and university development officers engaged in the process along with university-level marketing personnel is essential. They are often seeking high-value, student-focused experiences to gain funding from external stakeholders. Sharing the experiences with alumni and other stakeholders shows that the institution is providing students with outstanding critical thinking and collaboration skills. Documenting the workshop with video and/or photographs can provide development officers artifacts that they can they use to "sell" DT to external stakeholders.

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Figure 1: Plan

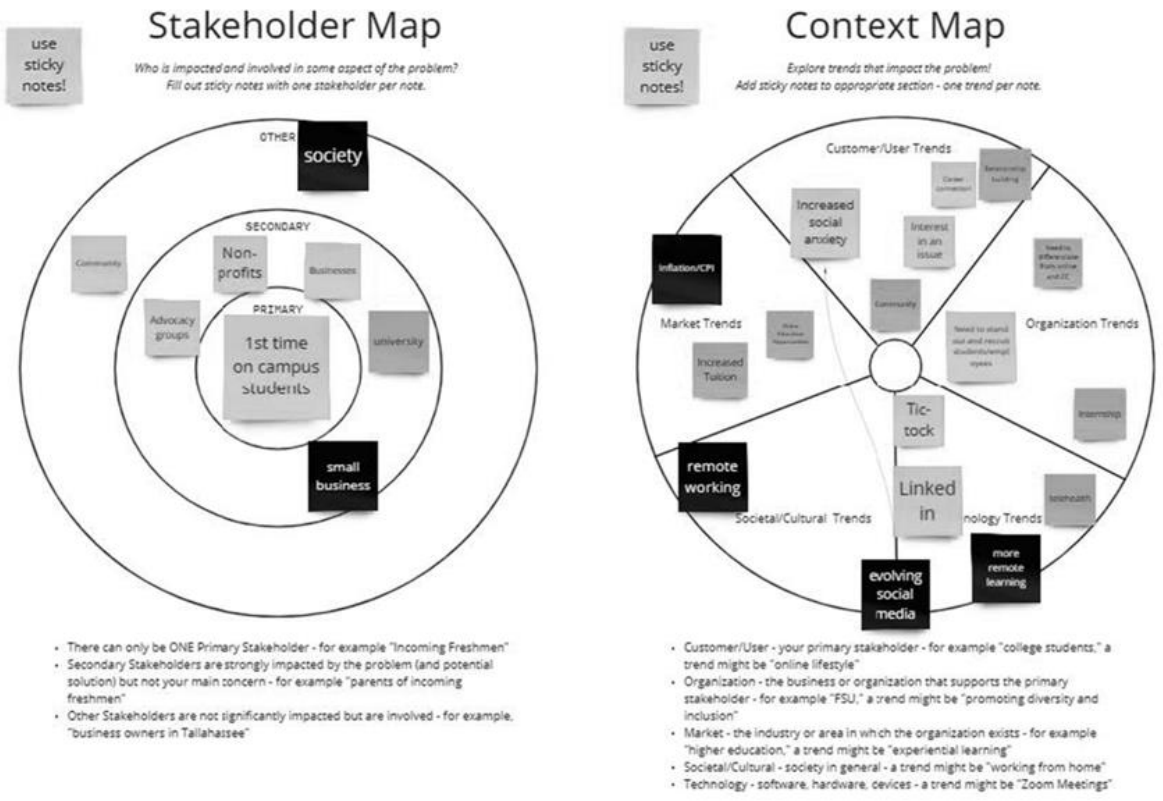

Figure 2: Empathy

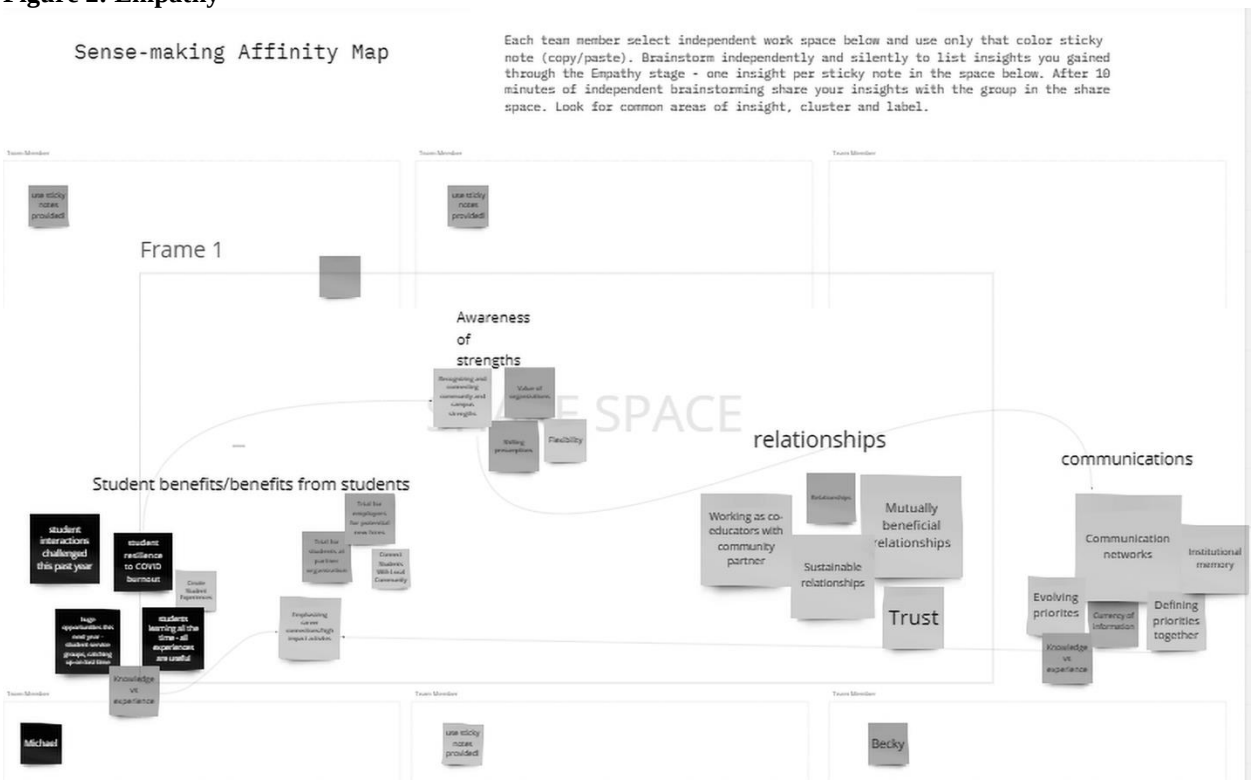

Figure 3: A to Z and Brand Hijack

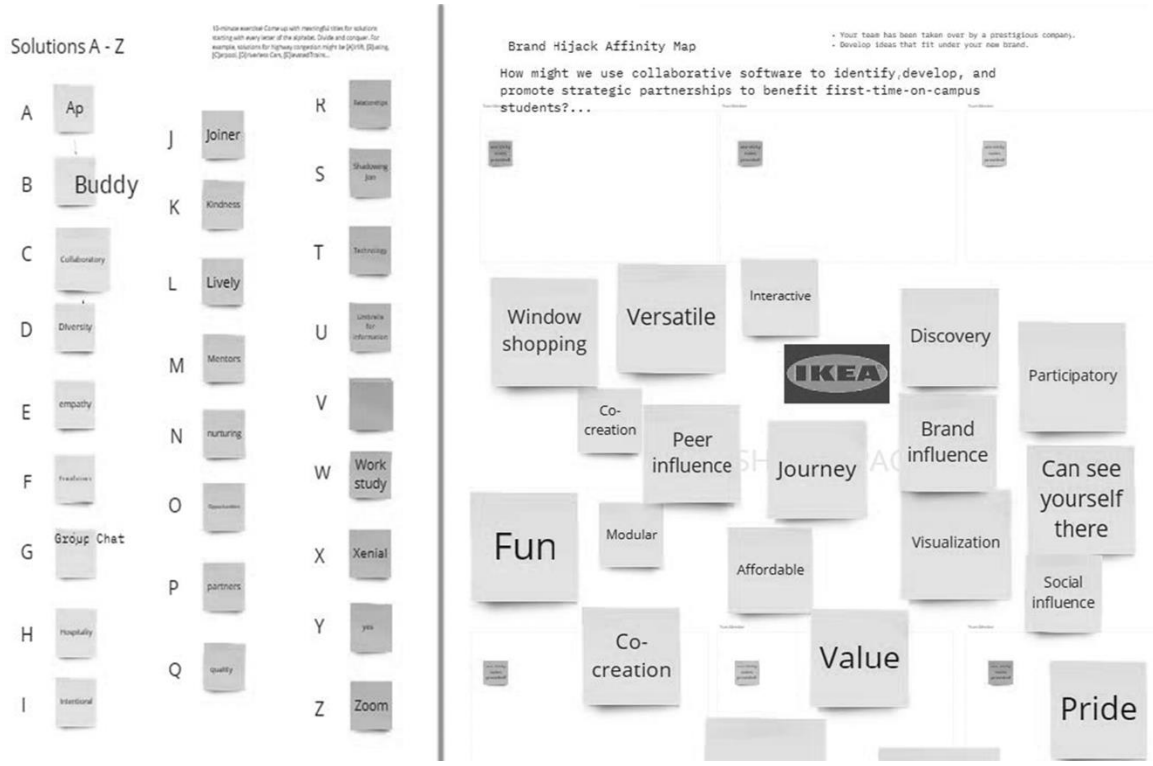

Figure 4: Storyboard

Figure 5: Feedback on Workshop

Below are a few participant replies to the question "How might the workshop help the university?"

"Having more people knowledgeable in this way of thinking will help the institution in many ways – teaching, research initiatives, administration."

"Connections. We grow when challenged by individuals that think differently than us. DT allows a safe space for exploration with progress to a goal."

"It seems like DT encourages stronger interdisciplinary work and can involve more campus stakeholders in curricular / programmatic changes."

"By creating critically thinking graduates."

Below are a few of their comments to the question "Do you think greater emphasis on this type of student development is needed?".

"Yes, absolutely. All students should be required to do this type of training in their first semester on campus."

"Yes."

"Absolutely."

"Yes. Students need more experience learning to learn and solve problems."

Below are a few of their comments to the question "How do you think this workshop may help students in the future to develop new ideas / be more creative or innovative? This assumes content and process is added to curricular and/or extracurricular activities?"

"I think because it's a framework it brings structure to a chaotic process that can be difficult to teach."

"Structured permission to challenge the norm, explore and grow."

"I can see a workshop like this one helping foster better teamwork in classes as well as in co-op / internship programs."

"Develop critical thinking and the ability to express an idea clearly in a number of ways."

Below are a few of their comments to the question "How do you think this workshop may help you to develop new ideas/be more creative or innovative?"

"I am energized by working with others from across the university and beyond! I will use many of the design thinking tools to help my colleagues with brainstorming/problem-solving. This in turn will help the students that we serve."

"Being able to conceptualize visually is extremely important for me, and especially if I am going to be sharing an idea with a group. This workshop should help create a process for that."

"I was introduced to new methods and toolkits for problem-solving that will help me rethink projects in my lab and work better with stakeholders."

"It's useful to have a framework for customer discovery. Design thinking has a lot of good elements to it that can be useful in innovation."

"Because, this is a structured procedure."

Figure 6: Revised Design Thinking Model

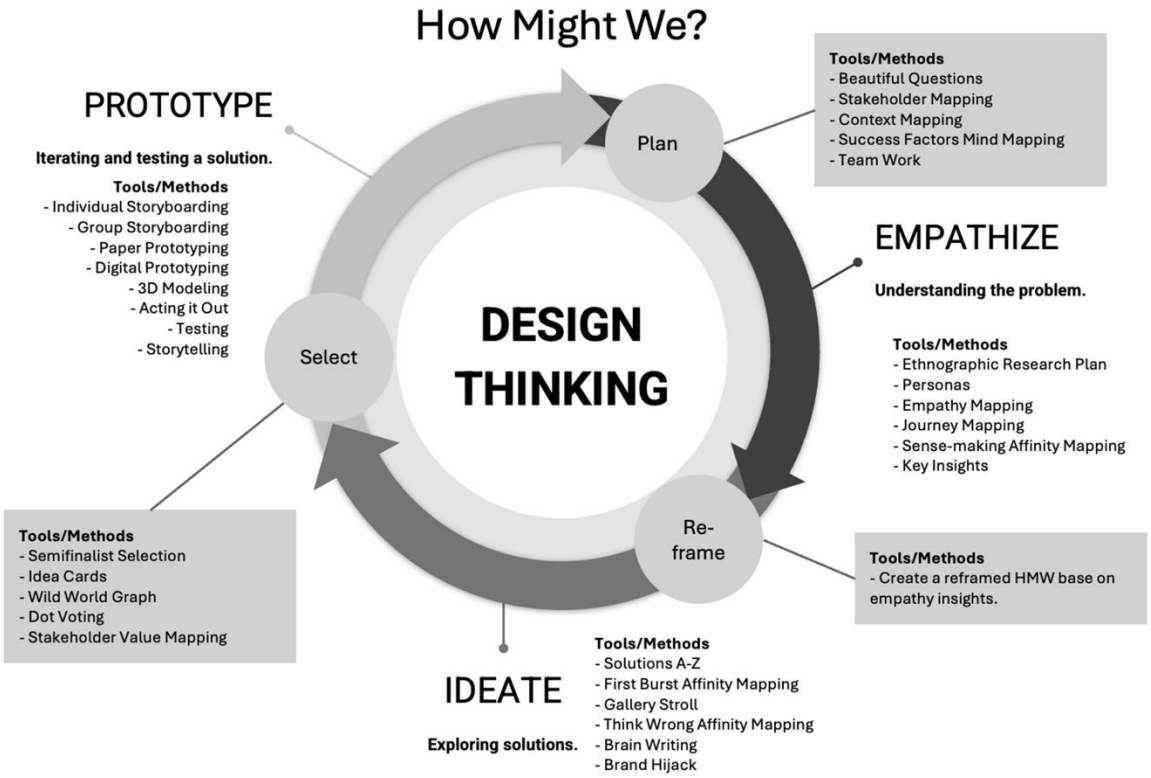

Figure 7: Student Feedback: "Would you change anything about how the DT Design challenge?"

- Great workshop, very helpful in team collaboration and working to find solutions.
- It was a nice length. I would just choose different hypothetical problems for each workshop. Change it up a bit.
- No, I think it was perfectly split between interactiveness and lecture.
- More group exercises and collaboration with other groups.
- Maybe do an online storyboard, so the whole team can interact easier.
- Very entertaining!
- Maybe we could create a problem or scenario in real life.
- I would want more detail to really get the full experience.
- I think it could be shorter and fit into 2 classes.
- I would recommend this for more marketing classes, it is very useful in all business skills.
- I don't have any suggestions. I really enjoyed it as is!
- Spend more time on the storyboard.
- Have more group projects in class.
- I would have liked to have a different topic; almost more of a case-study situation.
- I would maybe have every group use a different template like one does the ABC's another uses something else.

Peter Kaufman, PhD, is a Professor of Marketing in the College of Business and Director of the Stephen & Sharon Hagge Innovation Institute at Illinois State University. His research focuses on design thinking, marketing strategy, and innovation in higher education.

Nathan Hartman, PhD, is an Associate Professor of Management in the College of Business and Director of the Organization Leadership Institute at Illinois State University. His research focuses on organizational citizenship behaviors, employee selection, and leader development.

Rick Valentin is a Professor of Creative Technologies in the Wonsook Kim College of Fine Arts at Illinois State University. His research focuses on design thinking, participative decision-making, and collaborative problem solving and how these concepts can be utilized in a pedagogical context.

Gina L Hunter, PhD, is Professor of Anthropology and Director of the Office of Student Research at Illinois State University. Her scholarship includes research on ethnographic pedagogies and the Ethnography of the University.

Ken Baldauf is the Founding Director of the Florida State University Innovation Hub and CEO of Innovation by Design LLC.

Jim Jones is the Executive Director of the Katie School of Insurance & Financial Services at Illinois State University. He works with faculty and industry professionals in helping to develop a university research agenda, and curriculum for both undergraduate students and industry professionals.

Maria Luisa Zamudio, Ed.D., is the Executive Director Statewide Urban Programs and Partnerships in the College of Education at Illinois State University.

Becky LaMont, is an Adjunct Faculty in the Mennonite College of Nursing at Illinois State University. She is passionate about supporting students to become critical thinkers and innovators.

Endnotes

1. Due to the pandemic, face to face workshops were not feasible. Miro, a low-cost digital online white board customized for DT use, was used by facilitators at the workshops. The online whiteboard afforded many benefits over face-to-face: safety from pandemic health risks, comfort from one's location of choice, no travel expenses for facilitators living out of state, and a digital record of all activity for future reference. Conversely, face-to-face workshops can offer the following advantages over online: greater opportunity for human connection among participants, easier manipulation of post- its and other workshop materials and no need for a technology prep pre-meeting as was done for the online workshops. Links to the workshops are as follows: isu — Design Minded (https://www.designminded.me/isu, https://www.designminded.me/isudd)

2. Several guides for hands-on design thinking exercises for college students are available. Foster (2021) is recent and easy to follow guide for interested faculty to follow and implement in their classes.

The Impact of Mental Health on University Course Grades in an Introductory Business Class

James C. Brau, Brigham Young University, Utah, USA
Jameson L. Brau, Gonzaga University School of Law, Washington, USA

ABSTRACT

Brau, et al. (2016, 2017, 2021, 2022) have worked to determine factors of academic achievement in university business courses. The current study continues this thread of literature and introduces four mental health factors. These factors are attention deficient hyperactivity disorder (ADHD), autism spectrum disorder (ASD), anxiety, and depression. Using a sample of 864 college students, we find that ADHD, anxiety, and depression significantly and negatively correlate with student grades in univariate and pairwise tests. After applying controls, these three mental health variables lose their significance. In contrast, the ASD variables correlate significantly and positively with course grade in multivariate tests.

Keywords: business education, mental health, ADHD, ASD

INTRODUCTION

This paper continues a thread of literature with the purpose of determining factors that impact undergraduate student grades in business classes. To this point in the line of inquiry, dozens of relevant variables have been tested and retested to demonstrate that they correlate with student grades. For example, student prior college GPA, attitude toward the class, confidence in analytical abilities, and holding down a paying job have all repeatedly been shown to relate to student performance. In this paper, we introduce a new line of research by including variables for four mental health factors: attention deficient hyperactivity disorder (ADHD), autism spectrum disorder (ASD), anxiety, and depression. All four factors are self-reported by students as they take the questionnaire. In addition, for the ADHD and ASD questions, we incorporate widely accepted screening questionnaires to determine tendencies of each disorder.

Discussing mental health issues, even in an academic setting, can be tricky. Many readers will have loved ones, or themselves, who experience one or more of these factors which can lead to emotional responses. Some actually downplay ADHD as perhaps coming from poor parenting. Another example of some level of skepticism is a DailyWire opinion pieced titled, "How Big Pharma's Marketing Machine is Fueling the ADHD Surge."

In this paper we are agnostic as to what may cause any of these four mental health conditions, the veracity for the various diagnoses, etc. We leave these topics to mental health focused research as in Brau (2016). Our purpose is to measure each of the four mental health factors and test to see if they correlate with college grades in an introductory business course. Through difference-in-means tests we find that the three ADHD variables result in significantly lower course average by three to six percentage points. These points equate to one to two half-letter grades; for example decreasing from an A to an A- or B+. If a student replies that they do or might have ASD their score is roughly 4.5% lower. Those reporting they experience anxiety score about 2% lower and those with depression 4.5% lower. The only two mental health variables that are not statistically different in means are if a student thinks they have ASD (only 4 of 864 students) and the ASD screening metric.

When we turn to multivariate analyses with ordinary least squares (OLS) and Tobit models, a different picture emerges. In our grand regression that includes 48 regressors, none of the mental health factors are statistically significant. Ten of the control variables are significant and explain 46% of the variation in the course average. In parsimonious models that only include the 10 significant control variables and alternatively include the mental health variables, only the ASD screening score metric is statistically significant, with a positive coefficient at the 10% level.

Below we discuss the nuances of our findings and possible explanations. The next section presents a literature review, focusing mainly on the mental health variables as they are the innovation to the literature thread. We follow the literature review with a section on the data to include summary statistics and frequency distributions. Next, we present the empirical test strategy and the empirical results. Our final section discusses the limitations of our study, future research motivated by our study, and concludes.

LITERATURE REVIEW

Mental Health in the University Student Population

Mental health challenges affect a substantial portion of the college student population (American College Health Association, 2023). The most recent National College Health Assessment reports that of students surveyed 23.2%, 31.7%, and 11.7% reported experiencing significant depression, anxiety, or ADHD/ADD, respectively. Of the students who reported experiencing these challenges within 12 months of the survey date, 58.9%, 50.3%, and 66.9% stated that their depression, anxiety, or ADHD/ADD, negatively affected their academic performance, respectively (ACHA 2023).

Reviews of prior year reports of this and other datasets have shown that mental health issues such as anxiety, depression, and correlated difficulties have increased in the college student population substantially in recent years (Duffy, Twenge, & Joiner 2019). Other large studies have shown that adult and child diagnoses of attention deficient or hyperactivity disorders have increased substantially both in the United States and internationally over the last few decades (Chung, et al. 2019).

This trend appears to hold true for the college population as well (Oswalt, et al. 2020). Much less data is currently available on the prevalence of Autism Spectrum Disorder (ASD) in the college student population. There has been a continuing surge in ASD diagnosis in children over the past two decades (Maenner, et al. 2020), who are making their way into universities (Baker et al. 2019) with diagnosed individuals representing an estimated 2.3% of the student population (ACHA 2023). Current research on the academic outcomes of ASD individuals in college is limited (Gelbar et al. 2014), but it is clear they struggle with many facets of college life, including anxiousness, depression, and loneliness (Gelbar et al. 2014; Van Hees et al. 2014; Gurbuz et al. 2019).

At the time of writing there is a growing societal concern that mental illness is being over diagnosed in children and youth. This is particularly true of attention disorders, but is also true of ASD disorders and other illnesses (Abdelnour et al. 2022). It is believed that the increase in diagnosis is in part driven by changes in diagnostic criteria over the last 50 years, but researchers remain unable in large samples to reasonably identify false positives or account for false negatives (Merten et al. 2017).

It is worth noting that the questions for anxiety, depression, ADHD, and ASD in the ACHA include both symptomatic survey questions (e.g. “Within the last 12 months, I felt so depressed it was difficult for me to function”) and diagnostic survey questions (e.g. “Within the last 12 months I was diagnosed with Anxiety/Depression/ADHD, etc.”) The fact that the ACHA uses the 12-month time frame in some of their questions ensures that mental health diagnosis must be recent in order to qualify, and that faulty, inaccurate, or irrelevant diagnosis’s from when a university student was a child should not affect the survey results.

At the same time symptomatic questions enable researchers to identify individuals who may very well be struggling with mental conditions but have not been diagnosed for them. In the majority of papers viewed for this literature review, researchers employed diagnostic-criteria- style survey questions to their samples, to gain an accurate picture of how many clinically significant cases of mental illness were in their study samples and research groups. An exception to survey methodology was the literature on ASD, which due to ASD individuals being a smaller proportion of the student population and the severity of the condition, were generally identified by prior diagnosis in university records, university counseling surveys, or convenience surveys of the few ASD individuals that researchers could find with college experience.

Mental Health Impact on Academics

A robust literature exists showing that high levels of anxiety and its correlates, such as depression, are associated with poor academic performance (e.g., von der Embse et al. 2018; Segool et al. 2014; Akinsola & Nwajei 2013; Hysenbegasi et al. 2005), although the relationship between anxiety and academic performance is complex and research cannot definitively declare it casual (McKeachie 1984; Jamil et al.,2022). Literature on depression’s effects on college student academics coincides with research on depression and worker performance (Berndt et al. 1998). It has been shown that the treatment of anxiety or depression via cognitive behavioral therapy and other techniques can improve relevant academic performance (Hysenbegasi et al. 2005; Akinsola and Nwajei, 2013).

Attention deficit disorders have consistently been shown to reduce academic performance (Weyandt and DuPaul 2006), although much of the research on ADHD and university academic outcomes uses small samples sizes (Sedgwick 2018; Weyandt and DuPaul 2008). More recent studies of primary and secondary schooling settings have employed larger sample sizes allowing for stronger conclusions and proper handling of confounding variables, such as socio-economic status (Jangmo et al. 2019).

Current research has shown that ASD persons struggle in a variety of ways in the college setting, including effectively assimilating to a new lifestyle, academic workloads, over- stimulating environments, as well as feelings of loneliness, anxiousness, and depression (Gelbar et al. 2014). There are conflicting reports of the academic achievement of ASD individuals, with some studies demonstrating that ASD individuals perform no worse than there peers (e.g., Bakker et al. 2019). One study involving interviews with ASD individuals in college reported that interviewees consistently mentioned certain skill sets or strengths they leveraged in college, such as detailed observation and analytical skills, as well as strong memory (Van Hees et al. 2014).

Students in other small interview style studies also consistently report academic failure as being a consistent fear among ASD students, likely indicating academic difficulties, although these studies do not provide the GPA's or test scores of their students, and rarely employ sample sizes large enough to make that data statistically useful (Gelbar et al. 2014). Many of the universities that ASD students attend have varying kinds of accommodation provided either through disability offices or by professors and instructors directly. These efforts, along with a growing awareness of ASD issues may affect academic outcomes for these students, although information on direct academic outcomes of ASD students, with or without accommodation or support services, is extremely sparse.

Prior Research on Predictive Factors of Academic Performance

Beginning in 2016, Brau, et al. (2016, 2017, 2021, 2021, 2022) have worked to determine contributing factors to academic achievement in university business course settings. By employing robust samples with high response rates, this line of literature administered detailed surveys to business students in introductory marketing, information systems, and finance courses, exploring the relationships between course performance and traditionally researched variables, such as college GPA and ACT/SAT scores, as well as less explored factors, including student marital status, traumatic events during semester, and video game/social media consumption (Brau, et al. 2016, 2017, 2021, 2021, 2022).

These research efforts have not included direct questions on diagnosis of mental health, or perceived challenges due to specific emotional or mental conditions. During research on video game and social media consumption academic impacts, students were questioned on their emotional state and motivation for playing video games (Brau, et al. 2021, 2021, 2022), but these efforts did not explore baseline mental and emotional states or how these states separately influenced course success. In all of these studies (Brau, et al. 2016, 2017, 2021, 2021, 2022), students were asked if they experienced a "traumatic life event right before or during (the current semester), a proxy for emotional distress." Trauma is consistently correlated with poorer course performance, although the relationship is not always statistically significant.

DATA AND SUMMARY STATISTICS

Our survey data is collected from two large sections of an introductory finance class at a large, western US private university. The two sections consisted of 901 students, of which 864 usable responses were retrieved for a response rate of 95.9%. The survey was administered over a three-day period using Qualtrics, an online survey product, and included two attention-check questions. The survey instrument is a refined version of the instrument used in Brau, et al. (2016, 2017, 2021, 2021, 2022) with the addition of the mental health screening questions and self-reported mental health questions. A copy of the survey is available upon request.

Table 1 reports the summary statistics for the 59 control variables motivated by Brau, et al. (2016, 2017, 2021, 2022). The variables are sorted alphabetically by variable name. Each variable name can be referenced in Appendix A if the variable name is not sufficient. Detailed inspection of the table will be left to the reader. As an overview, the average student earned a 25.3 ACT, has a 3.6 college GPA, had a 3.8 high school GPA, and is 21.6 years old. The control variables are in-line with the prior surveys conducted in previous years in this same class with other students demonstrating generally consistent intertemporal metrics through the various semesters.

Table 2 reports the summary statistics for the various measures of ADHD, ASD, anxiety, and depression. Panel A reports the self-reported data straight from the survey instrument results. The replies to each of the questions are scored either 1-2 or 1-3. 1 is always yes, 2 is always no, and for those questions with a third option 3 is maybe. Panel B reports data that is computed from the original survey data. ADHDSCOREA (attention), ADHDSCOREH (hyperactivity), and ASDSCORE are comprised of the variables reported in Table 3. The four "Yes" variables in Table 2, Panel B are constructed as indicator variables that equal one when a student replied yes and zero otherwise. Inspection of Table 3 is left to the reader as the variables are discussed in Table 4.

Table 4 reports the frequency distribution for the variables in Table 3 Panel A. The first panel shows the distribution for the question, "Do you think you may have ADHD or ADHD tendencies?" 25.9% of the sample state yes with 25.6% stating maybe. In sum, 51.5% of the class think they have ADHD or the associated tendencies. A follow-up question reported in the second panel asks, "Have you ever been diagnosed with ADHD?" Only 8.2% of the student state yes, indicating that the other 370 students who think they might or do have ADHD have yet to be tested for diagnosis. Of the 70 students who have been diagnosed, 58.6% are currently taking medication for ADHD, reported in the third panel. (i.e., "Are you on medication for ADHD?").

The next two panels report the ASD questions. First, "Do you think you may have ASD (Autism Spectrum Disorder)?" results in 0.5% stating yes with 4.9% stating maybe. The same percentage (0.5%) answered yes to "Have you ever been diagnosed or told by a trained professional that you have ASD (Autism Spectrum Disorder)?" with another 0.5% stating they may have been. So although 46 students feel they have or may have autism, only four know they have been tested and four others think they may have been.

The main two research questions in this study are ADHD and ASD, however anxiety and depression were also asked as mental health control variables. To the question, "Have you ever been diagnosed with or do you feel like you may have anxiety?" 29.9% state yes with another 20.4% stating maybe. Similar to ADHD, more than half of the students think they do or may have anxiety. For the question, "Have you ever been diagnosed with or do you feel like you may have depression?" 18.2% of the students select yes with 14.5% stating maybe.

The purpose of our paper is not to test and analyze the prevalence of these four mental health conditions or to offer commentary on the level of testing and diagnosis. As stated above, we treat these variables as exogenous replies from the students and remain neutral on interpretation of the health conditions themselves. In the conclusion we discuss further areas of research that could relax our assumption of exogenous mental health data.

EMPIRICAL TESTS AND RESULTS

Our empirical testing strategy revolves around progression from univariate (i.e., difference-in-means t-tests) to pairwise (i.e., Spearman and Pearson correlations) to multivariate tests (i.e., OLS and Tobit regressions). The intent of each test is to determine factors that correlate with the grade earned in the course.

Difference-In-Means T-tests

Table 5 reports difference-in-means t-tests of average grade scores based on above- and below-median samples of each respective variable. The first three panels address ADHD. ADHDA, testing attention, indicates that the upper median of ADHD attention deficit tendencies earns 6.2% lower average in the class ($p<0.0001$). In this particular class, the average student in the upper half loses two half letter grades, so for example from an A to a B+. The ADHDH score testing hyperactivity also results in significant difference ($p<0.0050$) of 2.7 percentage points. Students responding that they think they have ADHD or its tendencies (ADHDTENDYES) experience 4.5% lower average ($p<0.0001$).

The next three panels in Table 5 report the three ASD measures. ASD and ASDTHINKYES are neither statistically different suggesting that displaying ASD tendencies does not impact the course grade. Adding to the indicator variable students who think they may have ASD (ASDTHINKYESMAYBE) results in a significant difference of 4.6% lower in grade ($p<0.0348$). The final two variables, Anxiety and Depression both result in lower performance, though Depression impacts the grade (4.5%, $p<0.0015$) stronger than Anxiety (1.8%, $p<0.0894$).

Spearman Pairwise Correlations

Table 6 reports the Spearman correlations between each of the mental health variables and course grade. We use Spearman specifications because many of the variables are ordinal in nature. Our results are robust (and even stronger) with Pearson correlation specifications. Of the ADHD self-reported variables, two (ADHDDiag and ADHDTENDYES) significantly correlate with course grade. Students with an ADHD diagnosis actual correlate with a higher grade, while those with overall ADHD tendencies perform worse. The two screening measures (ADHDSCOREA and ADHDSCOREH) both correlate strongly with poorer performance in the class.

The four ASD variables generally show no correlation with course grade. Recall the Variable ASDThink (the only significant ASD variable) equals 1 for yes, 2 for no, and 3 for maybe. The nature of the distribution with only four yes replies could be driving this result which was not seen in the t-tests from Table 5. The variable ASDTHINKYES most likely captures the effect better, demonstrating no correlation. Finally, both Anxiety and Depression negatively correlate with course average, consistent with Table 5.

Table 7 reports the correlation coefficients of each control variable that is significant beyond the 5% level. We use this analysis to choose which variables to include in the subsequent regressions. As the data in Table 7 is not germane to our fundamental mental health research questions, we leave inspection of the table to the reader.

OLS and Tobit Regressions

We next turn to multivariate tests to facilitate controlling for numerous factors at the same time. Table 8 reports our grand regression with all of the significant control variables from Table 7 and seven mental health variables. Ten of the control variables are statistically significant, after correcting for heteroscedasticity. None of the seven mental health variables are significant. Given the t-tests and correlation results, the nonsignificance is surprising. One plausible explanation could be multicollinearity. To test the possibility of multicollinearity, the final column of Table 8 reports the variance inflation factors (VIFs) for each variable. The highest VIF (for AcPerfor) is 2.4, indicating correlation among the independent variables is not a cause for concern. Given that both heteroscedasticity and multicollinearity have been accounted for, Table 8 leaves us to conclude that the difference in course grades in the previous univariate and pairwise students is not driven by the mental health factors.

In unreported robustness tests, we repeat the regression in Table 8 alternating in the various mental health variables. In none of the iterations are any of them significant in the grand model. To further explore these results, Table 9 Panel A reports the OLS results for a model including only the 10 significant control variables as well as the ADHDTENDYES and ASDTHINKYES indicator variables. Again, the ADHD and ASD variables are not significant while all 10 of the control variables maintain their significance. Panel B repeats the test substituting in the screening measurements for ADHD (ADHDA, ADHDH) and ASD (ASDSCORE). Somewhat surprisingly the ASDSCORE variable is statistically significant, though only at the 10% level ($p<0.085$). Again, all of the control variables maintain their significance.

Table 10 reports the Table 9 OLS analysis using a Tobit specification because the dependent variable, Grade, is truncated at 0 and 100. The Table 9 results are confirmed in Table 10 with the ADHD variables showing insignificance and the ASDSCORE variable positively significant beyond the 10% level ($p<0.067$).

LIMITATIONS AND CONCLUSION

In this study we have tested to determine if mental health factors correlate with course grade in an introductory business class. We build upon an established thread of literature (Brau, et al. 2016, 2017, 2021, 2021, 2022) and provide evidence of the relation of various factors. What we do not do is show causation or control for potential endogeneity issues. Our research design assumes that ADHD and ASD are both exogenous variables. Future research can, and should, relax these assumptions and design experiments and studies that can more directly establish causality and not simply correlation. Further research can explore the findings that ADHD decreases course grades in univariate and pairwise settings, but not in multivariate settings, even beyond an identification strategy. Unfortunately, our data panel does not facilitate these follow-on tests.

Given these limitations, how have we advanced the literature? First, we document that in univariate and pairwise tests ADHD robustly decreases grades in an introductory business class by one to two half letter grades (i.e., 3% to 6%

reduction). Second, we provide evidence that ADHD screening questionnaires result in metrics that statistically matter in these settings. Third, we provide mixed evidence on ASD and how it correlates with course grades. Only four students think they may have ASD, making statistical tests unreliable. When we include the 5% of students who think they may have ASD, we find an average of 4.6% underperformance in course grade. Fourth, we find both self-reported anxiety and depression result in significantly lower course averages of 1.8% and 4.5% respectively. Fifth, in OLS and Tobit tests only the ASD screening variable retains its statistical significance, and after including between 10 and 41 control variables, ASD becomes positively associated with course grade at the 10% level.

In sum, our current study extends our understanding of factors that influence course grades in an introductory business finance class. We anticipate this study to be the first in a series of papers exploring mental health factors and their impact in college course grades. Extensions will include those that address the limitations discussed above as well as including non-finance courses such as marketing, accounting, and information systems.

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James C. Brau, PhD, CFA,CFP® is a professor of finance at Brigham Young University, Utah, USA. His research interests include finance and university-level education.

Jameson L. Brau, MS, is a 3L student of law at Gonzaga University School of Law, Washington, USA. His research interests include law, business, constitutional studies, and philosophy.

Jim Brau is contact author at jbrau@byu.edu or 801.318.7919. The authors thank Eli Jackson and Adam Shill for outstanding research assistance. Jim Brau acknowledges funding through a Marriott School research grant and through his Joel C. Peterson Professorship. The authors thank Stephen Owen for constructive comments. This study was approved by the BYU IRB office.

Table 1: Summary Statistics of Control Variables

Variable	N	Mean	Std Dev	Min	Max
AcEffort	864	5.569	1.247	1	7
AchGoals	854	6.157	1.069	1	7
AcPerfor	864	5.021	1.500	1	7
AcScholHist	854	0.493	0.500	0	1
ACT	850	25.333	9.476	0	36
Age	828	21.632	1.879	18	31
Athlete	855	0.044	0.206	0	1
AttendClass	864	6.050	1.362	1	7
AttendFIN201	853	5.894	0.468	1	6
Attention2	855	0.995	0.068	0	1
BedTime	855	5.319	1.025	2	7
CollegeGPA	846	3.645	0.426	0	4
Children	855	0.026	0.158	0	1
CourseMat	862	5.290	1.161	1	7
Engagment1	857	0.967	0.178	0	1
English	855	0.947	0.223	0	1
FamFinance	852	0.357	0.479	0	1
FamilySpt	853	5.728	1.482	1	7
FinCareer	854	4.226	2.178	1	7
FinNewSub	854	5.255	1.501	1	7
FriendSpt	853	5.380	1.413	1	7
GoodNotes	853	5.509	1.364	1	7
HandleMany	853	5.324	1.425	1	7
HoursExtracurr	854	2.022	2.567	0	11
HoursPaidWork	852	2.550	1.967	0	7
HoursStudyExam	855	6.750	2.553	0.5	10
HourStudyNonExam	854	3.170	2.005	0.5	10
HouseCommSvc	853	1.866	0.922	0	6
HSGPA	851	3.845	0.232	2.5	4.96
InClass	863	5.316	1.563	1	7
Learn_GPA	864	4.584	1.620	1	7
LearnNew	796	3.788	1.338	1	7
Male	854	0.701	0.458	0	1
Marital	855	0.211	0.408	0	1
MathAbil	855	5.482	1.556	1	7
MathSkill	855	5.453	1.561	1	7
MISSION	853	0.890	0.505	0	3
NumStudyGroup	294	3.252	1.188	2	7
Online	856	3.692	1.509	1	7
OutClass	863	4.789	1.414	1	7
OutDifficult	855	5.827	1.048	1	7
PeerSpt	863	5.378	1.336	1	7
PersIntFin201	855	5.287	1.400	1	7
ProfSpt	863	5.783	1.225	1	7
Race	854	5.758	0.900	1	8
Retaking	855	0.048	0.214	0	1
SAT	829	8.692	11.328	1	33
SelfBelief	854	5.478	1.387	1	7
SemCreditHours	856	13.791	1.932	8	19
SmallClassBest	854	4.515	1.756	1	7
StudyGroup	855	0.344	0.475	0	1
StudyNotes	854	5.324	1.538	1	7
TA	855	1.385	1.512	0	6
TeachFin	855	0.524	0.500	0	1
Transfer	854	0.218	0.413	0	1
Traumatic	854	0.176	0.381	0	1
Tutor	854	0.406	1.058	0	6
UACLetter	856	0.061	0.239	0	1
WakeTime	855	5.185	1.237	2	10

Table 2: Summary Statistics of Mental Health Variables

Variable	N	Mean	Std Dev	Min	Max
Panel A					
ADHDTend	854	1.998	0.718	1	3
ADHDDiag	854	1.918	0.274	1	2
ADHDMed	70	1.414	0.496	1	2
ASDThink	854	2.044	0.228	1	3
ASDDiag	854	2.000	0.097	1	3
Anxiety	857	1.905	0.703	1	3
Depression	856	1.963	0.571	1	3
Panel B					
ADHDSCOREA	855	27.565	6.731	11	49
ADHDSCOREH	857	24.799	5.889	9	45
ASDSCORE	854	21.573	3.327	13	33
ADHDTENDYES	854	0.259	0.438	0	1
ASDTHINKYES	854	0.005	0.068	0	1
ANXIETYYES	857	0.299	0.458	0	1
DEPRESSIONYES	856	0.182	0.386	0	1

Table 3: Summary Statistics of AHDH and ASD Screening Variables

Variable	N	Mean	Std Dev	Min	Max	Measure
CarelessMist	861	7.885	0.857	6	10	ADHDA
TaskAttn	861	8.024	0.923	6	10	ADHDA
ConcentTalk	859	7.568	0.983	6	10	ADHDA
TaskFin	861	7.463	1.015	6	10	ADHDA
TaskOrg	860	7.390	0.973	6	10	ADHDA
LongMental	861	8.122	0.998	6	10	ADHDA
TaskLose	859	7.151	1.072	6	10	ADHDA
DistractEasy	861	8.181	0.951	6	10	ADHDA
DailyForget	860	7.516	0.924	6	10	ADHDA
Procrast	861	8.289	1.066	6	10	ADHDA
Fidget	859	8.283	1.192	6	10	ADHDH
LeaveSeat	859	6.807	0.917	6	10	ADHDH
FeelRestless	859	7.983	1.021	6	10	ADHDH
UnwindDiff	859	7.939	1.196	6	10	ADHDH
OnGo	859	8.461	1.047	6	10	ADHDH
TalkExces	857	7.684	1.079	6	10	ADHDH
SentenFinish	859	7.864	1.102	6	10	ADHDH
WaitLineTroub	859	7.478	1.044	6	10	ADHDH
Actvities	859	7.320	0.937	6	10	ADHDH
SmallSounds	857	7.690	0.928	6	9	ASD
CharIntentions	857	6.887	0.788	6	9	ASD
ReadBtwLines	857	8.176	0.777	6	9	ASD
WholePic	857	7.853	0.806	6	9	ASD
BoredListen	856	8.480	0.666	6	9	ASD
Multitask	856	7.600	0.908	6	9	ASD
FaceQueues	856	8.095	0.727	6	9	ASD
InterrupFocus	856	7.631	0.850	6	9	ASD
Categories	857	7.798	0.832	6	9	ASD
PeopIntentions	857	7.030	0.740	6	9	ASD

Table 4: Frequency Distribution of Mental Health Variables

ADHDTend	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes	221	25.88	221	25.88
No	414	48.48	635	74.36
Maybe	219	25.64	854	100

ADHDDiag	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes	70	8.2	70	8.2
No	784	91.8	854	100

ADHDMed	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes	41	58.57	41	58.57
No	29	41.43	70	100

ASDThink	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes	4	0.47	4	0.47
No	808	94.61	812	95.08
Maybe	42	4.92	854	100

ASDDiag	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes	4	0.47	4	0.47
No	846	99.06	850	99.53
Maybe	4	0.47	854	100

Anxiety	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes	256	29.87	256	29.87
No	426	49.71	682	79.58
Maybe	175	20.42	857	100

Depression	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes	156	18.22	156	18.22
No	576	67.29	732	85.51
Maybe	124	14.49	856	100

Table 5: Difference in Means T-tests of Mental Health Variables on Course Grade

ADHDA	N	Mean	Std Dev	Std Err	Pr > |t|
0	384	85.1579	10.5052	0.5361	<.0001
1	347	78.9677	14.7971	0.7944	
Diff (1-2)***		6.1902		0.9583	
ADHDH	**N**	**Mean**	**Std Dev**	**Std Err**	**Pr > |t|**
0	379	83.5334	12.1909	0.6262	0.0050
1	353	80.8143	13.8291	0.736	
Diff (1-2)***		2.7191			
ADHDTENDYES	**N**	**Mean**	**Std Dev**	**Std Err**	**Pr > |t|**
0	556	83.4834	11.8509	0.5026	<.0001
1	173	77.9382	15.7153	1.1948	
Diff (1-2)***		5.5452			
ASD	**N**	**Mean**	**Std Dev**	**Std Err**	**Pr > |t|**
0	352	82.1153	12.9359	0.6895	0.8315
1	378	82.3215	13.2059	0.6792	
Diff (1-2)		-0.2062			
ASDTHINKYES	**N**	**Mean**	**Std Dev**	**Std Err**	**Pr > |t|**
0	725	82.1698	13.0898	0.4861	0.9485
1	4	81.7461	11.9707	5.9854	
Diff (1-2)		0.4237			
ASDTHINKYESMAYBE	**N**	**Mean**	**Std Dev**	**Std Err**	**Pr > |t|**
0	691	82.4071	12.9923	0.4943	0.0348
1	38	77.8102	13.9974	2.2707	
Diff (1-2)***		4.5969			
ANXIETY	**N**	**Mean**	**Std Dev**	**Std Err**	**Pr > |t|**
0	521	82.7245	12.8212	0.5617	0.0894
1	211	80.9137	13.5882	0.9355	
Diff (1-2)***		1.8108			
DEPRESSION	**N**	**Mean**	**Std Dev**	**Std Err**	**Pr > |t|**
0	608	82.9714	12.6086	0.5113	0.0015
1	124	78.4328	14.5741	1.3088	
Diff (1-2)***		4.5386			

Table 6: Spearman Correlations of Mental Health Variables on Course Grade

ADHD Variables		ASD Variables	
ADHDTend	0.05866	**ASDThink**	-0.07522
	0.1136		0.0423
	729		729
ADHDDiag	0.09993	**ASDDiag**	-0.02474
	0.0069		0.5049
	729		729
ADHDMed	-0.04205	**ASDTHINKYES**	-0.00882
	0.7627		0.8120
	54		729
ADHDTENDYES	-0.16064	**ASDSCORE**	-0.01882
	<.0001		0.6118
	729		730
ADHDSCOREA	-0.21651	**ANXIETYYES**	-0.06637
	<.0001		0.0727
	731		732
ADHDSCOREH	-0.10403	**DEPRESSIONYES**	-0.13027
	0.0048		0.0004
	732		732

Table 7: Spearman Correlations of Control Variables on Course Grade

Positive Correlates						Negative Correlates	
Variable	**Grade**	**Variable**	**Grade**	**Variable**	**Grade**	**Variable**	**Grade**
AcEffort	0.36726	**HSGPA**	0.34471	**OutDifficult**	0.15133	**Online**	-0.1445
	<.0001		<.0001		<.0001		<.0001
	736		726		730		730
AcPerfor	0.50338	**SemCreditHours**	0.08047	**SelfBelief**	0.14189	**UACLetter**	-0.12827
	<.0001		0.0296		0.0001		0.0005
	736		731		729		731
CourseMat	0.44246	**MathAbil**	0.34231	**GoodNotes**	0.14762	**SmallClassBest**	-0.29197
	<.0001		<.0001		<.0001		<.0001
	734		730		728		729
InClass	0.07853	**MathSkill**	0.33211	**StudyNotes**	0.25232	**Age**	-0.23521
	0.0333		<.0001		<.0001		<.0001
	735		730		730		715
OutClass	0.14121	**AchGoals**	0.42234	**AcScholHist**	0.37944	**Marital**	-0.13622
	0.0001		<.0001		<.0001		0.0002
	735		729		729		730
AttendClass	0.16215	**FinCareer**	0.27063	**BYUGPA**	0.65826	**Children**	-0.10913
	<.0001		<.0001		<.0001		0.0032
	736		729		724		730
PeerSpt	0.14637	**FinNewSub**	0.28907	**Male**	0.0942	**HoursPaidWork**	-0.20134
	<.0001		<.0001		0.0109		<.0001
	735		729		729		727
ProfSpt	0.13251	**FamilySpt**	0.12965	**AttendFIN201**	0.12246	**Athlete**	-0.12315
	0.0003		0.0005		0.0009		0.0009
	735		728		729		730
ACT	0.36627	**FriendSpt**	0.10629	**TeachFin**	0.1306	**Transfer**	-0.17961
	<.0001		0.0041		0.0004		<.0001
	727		728		730		729
SAT	0.13652	**HandleMany**	0.17588	**PersIntFin201**	0.28816	**Tutor**	-0.14527
	0.0003		<.0001		<.0001		<.0001
	711		729		730		730
						Retaking	-0.08445
							0.0225
							730
						Traumatic	-0.16756
							<.0001
							729

Table 8: OLS Regression on Course Grade

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heterosc Consistent StdErr	Heterosc Consistent t Value	Heterosc Consistent Pr > |t|	Variance Inflation
Intercept	9.75	13.79	0.71	0.4796	18.73	0.52	0.6028	0
AcEffort	-0.63	0.46	-1.38	0.1671	0.50	-1.27	0.2046	2.16
AcPerfor	1.44	0.40	3.63	0.0003	0.48	3.00	0.0028	2.40
CourseMat	0.70	0.49	1.43	0.1527	0.52	1.34	0.1801	2.07
InClass	-0.23	0.31	-0.74	0.4598	0.30	-0.76	0.448	1.58
OutClass	0.32	0.31	1.03	0.3023	0.31	1.02	0.3098	1.35
AttendClass	0.02	0.35	0.05	0.9595	0.37	0.05	0.9624	1.66
PeerSpt	0.35	0.38	0.92	0.3567	0.36	0.98	0.329	1.83
ProfSpt	-0.50	0.39	-1.28	0.1995	0.38	-1.33	0.1847	1.51
Online	-0.60	0.26	-2.28	0.0230	0.27	-2.26	0.0243	1.14
ACT	0.04	0.04	0.81	0.4206	0.04	0.87	0.3861	1.32
SAT	0.05	0.03	1.31	0.1922	0.03	1.56	0.1188	1.19
HSGPA	1.95	2.06	0.94	0.3453	2.16	0.90	0.3688	1.51
SemCreditHours	-0.03	0.22	-0.13	0.9005	0.20	-0.13	0.8941	1.14
UACLetter	-3.80	1.74	-2.19	0.0292	2.38	-1.60	0.1101	1.16
MathAbil	1.17	0.29	4.03	<.0001	0.33	3.51	0.0005	1.44
AchGoals	1.49	0.46	3.23	0.0013	0.49	3.02	0.0026	1.70
FinCareer	0.13	0.25	0.53	0.5939	0.23	0.57	0.5676	2.18
FinNewSub	0.43	0.35	1.23	0.2201	0.32	1.35	0.178	2.03
FamilySpt	0.40	0.34	1.18	0.2401	0.46	0.87	0.386	1.70
FriendSpt	-0.48	0.37	-1.30	0.1933	0.43	-1.13	0.2593	1.99
HandleMany	0.13	0.38	0.34	0.7343	0.43	0.30	0.7612	2.13
OutDifficult	-0.68	0.46	-1.46	0.1443	0.47	-1.45	0.1486	1.77
SelfBelief	-0.27	0.33	-0.81	0.4206	0.34	-0.79	0.4296	1.58
SmallClassBest	-0.62	0.23	-2.66	0.0080	0.23	-2.69	0.0074	1.22
GoodNotes	0.31	0.36	0.87	0.3869	0.41	0.77	0.4441	1.75
StudyNotes	0.14	0.32	0.42	0.6716	0.36	0.38	0.7077	1.68
Age	0.07	0.27	0.26	0.7974	0.30	0.24	0.8139	1.84
Marital	-1.33	1.07	-1.24	0.2142	0.97	-1.37	0.1697	1.38
Children	-4.60	2.96	-1.55	0.1216	3.33	-1.38	0.1682	1.26
HoursPaidWork	-0.41	0.21	-1.89	0.0594	0.21	-1.92	0.0558	1.29
Athlete	-2.56	2.03	-1.27	0.2062	2.21	-1.16	0.2476	1.23
AcSchoolHist	3.21	0.87	3.71	0.0002	0.97	3.30	0.001	1.38
Transfer	-1.82	1.14	-1.59	0.1134	1.17	-1.56	0.1201	1.49
BYUGPA	8.06	1.01	7.95	<.0001	2.97	2.71	0.0068	1.44
MALE	1.72	0.94	1.84	0.0662	0.93	1.86	0.0631	1.41
AttendFIN201	1.29	0.99	1.30	0.1934	1.05	1.24	0.2171	1.42
Tutor	-1.07	0.40	-2.66	0.0079	0.44	-2.42	0.0158	1.23
TeachFin	1.05	0.81	1.31	0.1910	0.73	1.45	0.1484	1.19
PersIntFin201	0.62	0.40	1.55	0.1207	0.39	1.58	0.114	2.12
Retaking	3.11	1.90	1.64	0.1023	2.09	1.49	0.1364	1.16
Traumatic	-0.74	1.11	-0.66	0.5065	1.15	-0.64	0.5194	1.24
ADHDSCOREA	0.06	0.08	0.77	0.4388	0.10	0.66	0.5104	2.13
ADHDSCOREH	-0.05	0.08	-0.6	0.5492	0.09	-0.57	0.5684	1.66
ASDSCORE	0.13	0.13	1.04	0.2985	0.13	1.05	0.2947	1.34
ADHDTENDYES	-1.06	1.10	-0.96	0.3371	1.17	-0.91	0.3652	1.58
ASDTHINKYES	0.71	1.86	0.38	0.7022	1.80	0.39	0.6931	1.22
ANXIETYYES	0.07	1.01	0.07	0.9408	0.86	0.09	0.9304	1.53
DEPRESSIONYES	0.53	1.20	0.45	0.6565	1.08	0.49	0.6219	1.50
n	657							
Pr > F	<.0001							
Adj R-Sq	0.4592							

Table 9: Spearman Correlations of Control Variables on Course Grade

Panel A					
Variable	**Parameter**	**Heteroscedasticity**			**Variance**
	Estimate	**Std Error**	**t Value**	**Pr > |t|**	**Inflation**
Intercept	25.70	9.68	2.66	0.008	0.00
AcPerfor	1.43	0.38	3.71	0.000	1.34
Online	-0.55	0.27	-2.06	0.040	1.04
MathAbil	1.31	0.30	4.31	<.0001	1.19
AchGoals	2.37	0.40	5.93	<.0001	1.15
SmallClassBest	-0.73	0.22	-3.34	0.001	1.09
HoursPaidWork	-0.68	0.20	-3.39	0.001	1.06
AcScholHist	3.10	0.95	3.25	0.001	1.22
BYUGPA	8.81	2.94	2.99	0.003	1.30
MALE	1.77	0.78	2.26	0.024	1.03
Tutor	-1.28	0.48	-2.68	0.008	1.03
ADHDTENDYES	-1.46	0.97	-1.50	0.133	1.10
ASDTHINKYES	0.71	1.72	0.41	0.679	1.06
Pr > F	<.0001				
N	705				
Adj R-Sq	0.4417				
Panel B					
Variable	**Parameter**	**Heteroscedasticity**			**Variance**
	Estimate	**Std Error**	**t Value**	**Pr > |t|**	**Inflation**
Intercept	20.63	10.20	2.02	0.044	0.00
AcPerfor	1.52	0.39	3.9	0.000	1.40
Online	-0.55	0.27	-2.04	0.042	1.03
MathAbil	1.33	0.31	4.28	<.0001	1.21
AchGoals	2.38	0.41	5.84	<.0001	1.15
SmallClassBest	-0.77	0.22	-3.45	0.001	1.10
HoursPaidWork	-0.65	0.21	-3.07	0.002	1.08
AcScholHist	3.02	0.95	3.18	0.002	1.22
BYUGPA	8.95	2.95	3.03	0.003	1.32
MALE	1.86	0.78	2.38	0.018	1.04
Tutor	-1.27	0.48	-2.65	0.008	1.04
ADHDSCOREA	-0.03	0.08	-0.33	0.738	1.58
ADHDSCOREH	0.00	0.08	-0.06	0.954	1.34
ASDSCORE	0.21	0.12	1.72	0.085	1.12
Pr > F	<.0001				
N	705				
Adj R-Sq	0.4426				

Table 10: Spearman Correlations of Control Variables on Course Grade

Panel A

Analysis of Maximum Likelihood Parameter Estimates						
Parameter	**Estimate**	**Standard Error**	**95% Confidence Limits**		**Chi-Square**	**Pr > Chi Sq**
Intercept	25.70	4.29	17.29	34.11	35.88	<.0001
AcPerfor	1.43	0.29	0.85	2.00	23.66	<.0001
Online	-0.55	0.25	-1.04	-0.06	4.88	0.0271
MathAbil	1.31	0.26	0.80	1.81	25.48	<.0001
AchGoals	2.37	0.36	1.66	3.09	42.41	<.0001
SmallClassBest	-0.73	0.22	-1.16	-0.31	11.42	0.0007
HoursPaidWork	-0.68	0.19	-1.06	-0.30	12.33	0.0004
AcScholHist	3.10	0.81	1.51	4.68	14.70	0.0001
BYUGPA	8.81	0.97	6.92	10.71	83.33	<.0001
MALE	1.77	0.80	0.20	3.34	4.87	0.0274
Tutor	-1.28	0.36	-1.98	-0.58	12.72	0.0004
ADHDTENDYES	-1.46	0.90	-3.23	0.31	2.60	0.1067
ASDTHINKYES	0.71	1.67	-2.56	3.98	0.18	0.6700

Panel B

Analysis of Maximum Likelihood Parameter Estimates						
Parameter	**Estimate**	**Standard Error**	**95% Confidence Limits**		**Chi-Square**	**Pr > Chi Sq**
Intercept	20.63	5.54	9.78	31.48	13.88	0.0002
AcPerfor	1.52	0.30	0.93	2.11	25.39	<.0001
Online	-0.55	0.25	-1.04	-0.06	4.81	0.0284
MathAbil	1.33	0.26	0.81	1.84	25.61	<.0001
AchGoals	2.38	0.36	1.66	3.09	42.46	<.0001
SmallClassBest	-0.77	0.22	-1.20	-0.34	12.26	0.0005
HoursPaidWork	-0.65	0.20	-1.04	-0.27	11.14	0.0008
AcScholHist	3.02	0.81	1.43	4.60	13.93	0.0002
BYUGPA	8.95	0.97	7.05	10.85	84.84	<.0001
MALE	1.86	0.81	0.28	3.43	5.32	0.0211
Tutor	-1.27	0.36	-1.97	-0.56	12.36	0.0004
ADHDSCOREA	-0.03	0.07	-0.16	0.11	0.14	0.7080
ADHDSCOREH	0.00	0.07	-0.15	0.14	0.00	0.9489
ASDSCORE	0.21	0.12	-0.01	0.44	3.36	0.0670

Appendix A: Variable Definitions from Survey

AcEffort	Rate the following statements on how they apply to you: - I feel satisfied with my academic efforts.
AchGoals	I am determined to do well in my finance course because I want to achieve my academic goals.
AcPerfor	Rate the following statements on how they apply to you: - I feel satisfied with my academic performance.
AcScholHist	Have you received an academic scholarship?
AcScholNow	Are you currently on academic scholarship?
ACT	What is the highest score you received on the ACT?
Activities	Do you interrupt or intrude on others? (e.g. butt into conversations or actvities)
ADHDDiag	Have you ever been diagnosed with ADHD?
ADHDMed	Are you on medication for ADHD?
ADHDTend	Do you think you may have ADHD or ADHD tendencies?
Age	What is your age?
Anxiety	Have you ever been diagnosed with or do you feel like you may have anxiety?
ASDDiag	Have you ever been diagnosed or told by a trained professional that you have ASD (Autism Spectrum Disorder)?
ASDThink	Do you think you may have ASD (Autism Spectrum Disorder)?
AthGames	Did you attend any or all of your sport's games during this semester?
Athlete	Are you a Collegiate Athlete?
AthScholar	Have you received an athletic scholarship?
AttendClass	Rate the following statements on how they apply to you: - I attend all of my classes.
AttendFIN201	How often did you attend FIN 201 class this semester?
Attention2	Are you still paying attention to the survey?
BedTime	What time do you typically go to sleep at night?
BoredListen	I know how to tell if someone listening to me is getting bored.
BYUGPA	What is your BYU GPA (4.00 maximum)?
CarelessMist	Do you struggle to pay close attention to details or make careless mistakes in your work?
Categories	I like to collect information about categories of things.
CharIntentions	When I'm reading a story, I find it difficult to work out the characters' intentions.
Children	Do you have children?
ConcentTalk	How often do you have difficulty concentrating on what people say to you, even when they are speaking directly?
CourseMat	Rate the following statements on how they apply to you: - I feel like I understand my course material.
DailyForget	Are you forgetful in daily activities?
Depression	Have you ever been diagnosed with or do you feel like you may have depression?
DistractEasy	Are you easily distracted?
Engagment1	Are you still engaged in taking this survey?
English	Is English your native/first language?
FaceQueues	I find it easy to work out what someone is thinking or feeling just by looking at their face.
FamFinance	Do you have a parent, sibling, or close associate who works in the finance field?
FamilySpt	I get the emotional help and support I need from my family.
FeelRestless	How often do you feel restless?
Fidget	Do you fidget with or tap your hands or feet/Do you squirm in your seat?
FinCareer	I am determined to do well in my finance course because I want to pursue a career in finance.
FindStudyGroup	How did you find one another to form your group?
FinNewSub	I am determined to do well in my finance course because I am interested in learning new subjects.
FriendSpt	My friends really try to help me.

Gender	To which gender identity do you most identify?
GoodNotes	I take good notes in class.
HandleMany	I feel I can handle many things at a time.
HoursExtracurr	Approximately how many hours did you spend each week participating in extracurricular activities?
HoursPaidWork	How many hours each week have you spent at a paid job this semester?
HoursStudyExam	How many hours per exam week do you study outside of class for FIN 201 class?
HourStudyNonExam	How many hours per non-exam week do you study outside of class for FIN 201 class?
HouseCommSvc	How many hours each week do you spend serving in your religious or spiritual community?
HSGPA	What is your high school unweighted GPA (4.0 maximum)?
InClass	Rate the following statements on how they apply to you: - I learn best when in class.
InterrupFocus	If there is an interruption, I can switch back to what I was doing very quickly.
Learn_GPA	Rate the following statements on how they apply to you: - I care more about learning material than GPA.
LearnNew	Regarding online learning sources, how often do you choose to learn something not required for your coursework?
LeaveSeat	How often do you leave your seat in meetings or other situations in which you are expected to remain seated?
LongMental	Do you avoid or are reluctant to do tasks that require mental effort over a long period of time (such as homework)?
MajorCat	Are you a Pre-finance major, Non-finance business major, Business minor, or neither?
MajorCat	What is your major?
Marital	What is your marital status?
MathAbil	I have confidence in my math ability.
MathSkill	I believe I have good math skills.
Mission	Have you served a full-time mission for The Church of Jesus Christ of Latter-Day Saints?
Multitask	I find it easy to do more than one thing at once.
NumStudyGroup	How many people (yourself included) regularly participate in your study group?
OnGo	Do you often feel "on the go" as if you're driven by a motor?
Online	How often do you use online learning resources … that are not part of assigned material?
OnName	What online learning sources do you use?
OnOther	If you chose other, please list which online learning sources you use:
OutClass	I learn best outside of class through personal study.
OutDifficult	When I am in a difficult situation, I can usually find my way out of it.
PeerSpt	I feel supported by my peers in my academic efforts.
PeopIntentions	I find it difficult to work out people's intentions.
PersIntFin201	What is your personal level of interest in this FIN 201 class topic?
Procrast	How often do you put things off until the last minute?
ProfSpt	I feel my professors want me to succeed.
Race	How do you identify your race?
ReadBtwLines	I find it easy to "read between the lines" when someone is talking to me.
ReadFIN201	What percentage of the assigned readings do you generally have completed before attending FIN 201 class?
Retaking	Are you retaking this class?
SAT	What is the highest score you received on the SAT? (Scaled to ACT)
SelfBelief	My belief in myself gets me through hard times.
SemCreditHours	How many credit hours are you taking this semester? (Round up)
SentenFinish	When you're in a conversation, how often do you find yourself finishing the sentence of the people?
SmallClassBest	Class size affects my overall performance -- the smaller the class the better.

SmallSounds	I often notice small sounds when others do not.
StudyGroup	Are you in a study group for FIN 201 class?
StudyNotes	Studying my notes improves my performance in class.
TA	How often do you use TA Office Hours for FIN 201 class?
TalkExces	Are you an excessive talker?
TaskAttn	Do you have trouble paying attention to the tasks you're doing?
TaskFin	Do you struggle to finish schoolwork, chores, or tasks at work?
TaskLose	How often do you lose things necessary for tasks and activities (e.g. school materials, books, wallet, keys, phone)?
TaskOrg	Do you have trouble organizing tasks and activities?
TeachFin	Do you teach other people principles from the FIN 201 class in order to help you learn the material from class?
TranSchool	From which school did you transfer?
Transfer	Did you transfer to BYU from another university?
Traumatic	Did you happen to experience a traumatic life event right before or during this semester (*examples given*)?
Tutor	How often do you use tutors (non-TAs) for FIN 201 class?
UACLetter	Do you have a letter on file with the University Accessibility Center (UAC) that provides accommodations to you?
UnwindDiff	How often do you have difficulty unwinding and relaxing when you have time to yourself?
WaitLineTroub	Do you have trouble waiting in lines or for your turn?
WakeTime	When do you generally wake up?
WholePic	I usually concentrate more on the whole picture, rather than the small details.

Survey of Employers' Perceptions of MBA Value and Incorporating Data Analytics Curriculum to Add Value

Kevin Pan, Samford University, Alabama, USA
C. Clifton Eason, Samford University, Alabama, USA
Bayleigh Garmon, Samford University, Alabama, USA
Bailey Spaulding, Samford University, Alabama, USA

ABSTRACT

In today's business world, it seems that graduate education is unimportant for getting a desirable job. Meanwhile, new business analytics and artificial intelligence technologies require professionals to acquire more education. In this study, we survey business professionals' views on graduate education. We found that graduate education, e.g., Master of Business Administration (MBA), is not viewed as essential. However, an analytics curriculum can add value to graduate education and make it much more marketable to pursue graduate business degrees. Further, our study reveals the data analytics topics that should be incorporated into graduate business education.

Keywords: Master of Business Administration, graduate curriculum, data analytics, industry survey, business education.

INTRODUCTION

There is perhaps a decreased interest in graduate business degrees, e.g., Master of Business Administration (MBA) or Master of Accounting (MAcc). In 2022, total graduate management applications dropped by 3.4%; specifically, MBA applications dropped by 6.5% (Graduate Management Admission Council, 2022).

While there may be a decline in interest in graduate study, the business world today also requires business professionals to acquire more skills to face the new challenges of the day. Specifically, one challenge is the explosion of data in the business world. To handle and gain insights from the large amounts of data, business professionals need to learn new skills and new tools. This has been further exacerbated recently with the advancement of machine learning and artificial intelligence (Xu & Babaian, 2021); business professionals need to learn analytics to keep up with the new developments.

Previous literature addressed the value of MBA. While various papers addressed the value of MBA from different perspectives, one theme seemed to be that an MBA program is intended to help its graduates advance their careers. Therefore, a good measure of MBA's value may be how it helps graduates contribute at work, as perceived by prospective employers. For example, Haksever and Muragishi (1998) examined the salary and employment improvement from receiving an MBA and found that the top 20 programs are not necessarily more efficient than the next 20 programs in terms of employment opportunity improvement. Baruch and Leeming (2001) surveyed 344 MBA graduates in the United Kingdom and found improvement in managerial skills and self-confidence through the MBA program. Bruce (2009) surveyed 16,268 MBA graduates and found that student satisfaction contributes to the perceived value of MBA.

In terms of using industry needs to help design a business analytics curriculum. Stanton and Stanton (2020) conducted an assessment of employers' needs for analytics skills to inform analytics curriculum development.

Various authors have developed data analytics curricula for MBA programs. For example, Lu (2022) described the development of an Insight Management module to incorporate data science in an executive MBA program. Diamant (2023) described using Excel to introduce predictive and prescriptive analytics in an MBA program.

In this paper, we address the unique question of using an industry survey to help incorporate an analytics curriculum into an MBA/MAcc program to add value to an MBA/MAcc program. We collected our data in two ways: First, we conducted informational interviews with a small number of industry professionals and hiring managers. These interviews allowed directed and yet open-ended discussions to understand the pressing issues that the industry is facing. The second step we took was to design and conduct a survey for advisory board members and alumni. The survey results provide insights on the value of adding of analytics curriculum and what topics to include.

The main contribution of this paper is to show that an analytics curriculum can enhance the perceived value of an MBA program industry; our study results also showed what topics to include in the analytics curriculum to add further value to graduate business programs. The rest of this paper is organized as follows: Literature Review, Research Hypotheses and Questions, Methods and Data Sample, Results, Conclusion.

PREVIOUS RESEARCH

Value of MBA Education

Previous literature addressed the value of MBA. While various papers addressed the value of MBA from different perspectives, one theme was that an MBA program was intended to help its graduates advance their careers. Therefore, a good measure of MBA's value could be how it helped graduates contribute at work, as perceived by prospective employers.

For example, Haksever and Muragishi (1998) examined the salary and employment improvement from receiving an MBA; they calculated the "efficiency" of an MBA by the percentage of students having jobs by graduation and the average starting salary, and they found that the efficiency of the top 20 MBA programs in the United States (based on Business Week's ranking) was not significantly different from that of the next 20 programs in the United States. In other words, the top 20 programs might not provide more value to a student than the next 20 programs in terms of employment and salary.

Baruch and Leeming (2001) surveyed 344 MBA graduates of a leading business school in the United Kingdom. These graduates attributed to the MBA program for their perceived improvement in their managerial skills and self-confidence; these MBA graduates also attributed their value-adding to their employers to the competences acquired from their MBA study.

Bruce and Edgington (2008) assessed the value of MBA based on students' perceived salary increase and skill improvement due to the MBA program; they found that perceived MBA values is positively associated with MBA students' willingness to recommend the program.

To understand if student satisfaction affects students' perceived value of MBA education, Bruce (2009) used data of 16,268 MBA graduates from Global MBA Graduate Surveys conducted by the Graduate Management Admission Council. The survey was a global survey, with 78% of survey respondents from schools in the United States. The regression analysis result showed that student satisfaction contributes significantly to students' perceived value of MBA.

Ramlall and Ramlall (2016) discussed the value of MBA from the perspectives of students, faculty, and employers: for students and faculty, it seemed that an important expectation of MBA was to prepare students for their careers; likewise, employers consider MBA to be valuable because managers can improve their work through MBA programs. Therefore, a major value of MBA seemed to come from MBA graduates' ability to add value to employers.

Incorporating Data Analytics Education in MBA

The literature has addressed the incorporation of data analytics education into general graduate business education, i.e., MBA curriculum. Meanwhile, the literature on developing specialized graduate data science programs is outside of the scope of this paper.

Paul and MacDonald (2020) examined skill-based gaps between industry and academia, and performed a clustering analysis. They then used their skill analyses to provide insights for designing undergraduate and graduate curriculum for data analytics.

Lu (2022) described the development of an Insight Management module to incorporate data science in an executive MBA program; the module helped executive MBA students develop analytical thinking skills of data and understanding the process of data analytics in business management.

Diamant (2023) described using Excel to introduce predictive and prescriptive analytics to MBA students that do not have a technical background. By using Excel, students can learn analytics concepts more quickly. Students had positive evaluations of the course.

Bačić et al. (2023) described the development of a business analytics graduate certificate. The certificate included both conceptual learning and software tool learning. The authors described the history of the certificate program. The certificate program was well received by the students.

Surveying Industry Needs

Stanton and Stanton (2020) analyzed job postings to assess employers' needs for analytics skills to inform analytics curriculum development. The authors analyzed 191,276 LinkedIn job postings in the United States in April 2019. The authors compiled a list of the most sought-after hard skills and soft skills for entry-level positions. For analytics positions, the most sought-after hard skill is data analysis, and the most sought-after soft skill is analytical skills.

Based on the literature review, our manuscript contributes to the literature by studying whether and how incorporating data analytics can add value to MBA education, and we studied this question through informational interviews and surveying business professionals. The results can help to design an MBA curriculum that incorporates data analytics.

RESEARCH HYPOTHESES AND QUESTIONS

Based on the notions that MBA value comes from an MBA program's ability to help graduates improve employment (Haksever & Muragishi, 1998)) and be better prepared for jobs (Baruch & Leeming, 2001), and that industry values data analytics competencies (Paul & MacDonald, 2020; Stanton & Stanton, 2020), we make the following hypotheses:

Hypothesis 1: receiving a data analytics concentration with an MBA is more desirable than having an MBA degree without a data analytics concentration. In other words, a Data Analytics Concentration adds value to an MBA degree.

Hypothesis 2: receiving a dual degree in data analytics with an MBA is more desirable than having an MBA degree alone. In other words, a Dual Master's degree in Data Analytics adds value to an MBA degree.

In addition to these two hypotheses, we also ask the following research questions that can help business schools integrate data analytics into MBA programs:

Research Question 1:

What data analytics skills do industry professionals consider important for new hires when they join the organization?

With data analytics, there are different types of skills. For example, there are hard skills, which refer to specific technical skills, and soft skills, which refer to overall abilities (Stanton & Stanton, 2020). For example, Stanton and Stanton (2020) found that the top hard skills required in industry include data analysis, computer programming, machine learning, artificial intelligence, and data visualization; the top soft skills include analytical skills, problem solving skills, and communication skills. Likewise, Paul and MacDonald (2020) included both hard skills and soft skills in their analytics curriculum. Therefore, based on the literature, it seemed to be better for graduate students to take at least one analytics course than no course, in order to acquire the analytics skills desired by employers. A new question we seek to understand is what skills should be covered in this course. Learning from the literature and our informational interviews, we sought to understand the perceived importance of the following analytics competencies for new hires when they join a team as new MBA graduates:

1. Overall analytics competency.
2. Ability to manage a high-level project using data analytics as part of corporate strategy.
3. Hands-on technical skills to be able to prepare and analyze data for reporting or insights.
4. Ability to handle real-world business problems.
5. Problem solving and analytical mindset.
6. Communications and presentation skills.
7. Statistical analysis.
8. Computer programming.

Research Question 2:

How prepared do industry professionals perceive new hires to be in data analytics?

MBA preparedness for real-world work is an important consideration (Witt et al., 2019). In our study, we want to investigate what competencies (the same competencies in the previous question) are considered important and how

prepared the graduates are. We would give highest priority to topics that are considered most important and graduates least prepared.

Research Question 3:
What analytics courses and skills would be most relevant for the graduate business curriculum to include? In this question, we seek to ask the survey respondents in a different way from the previous question: what courses do they see as most important? This could help to inform what courses to offer as elective courses that students could take to not only satisfy the MBA requirement but also for Analytics Concentration or an Analytics degree.

Research Question 4:
How much on-the-job analytics training do companies offer their new hires?
This question stemmed from our informational interview. Some interviewees said their companies offered analytics training to new hires. Therefore, we asked the survey participants what level of job training companies provide. Even though the interviewees told us that the on-the-job training does not make graduate analytics training redundant, we were interested in getting more quantitative understanding of the extent of on-the-job analytics training.

METHODS AND DATA

As the research began as a student project for college course credit, it qualified for our institution's IRB Category 1 exemption. The research team consisted of two senior analytics students and two faculty members. To address our research questions and hypotheses, we designed two studies. The first study consisted of informational interviews that helped us understand the analytics needs of employers and how they perceived the value of graduate business programs in addressing those needs. We used our takeaways from this first study to create a second study, web-based survey that generates a larger quantity of data for analysis, as elaborated upon in the next sections.

Study 1: Informational Interviews

Research Design and Procedures

We conducted informational interviews via video calls with industry professionals to improve our understanding of organizations' analytics needs and inform our forthcoming survey. The informational interviews consisted of broad, open-ended questions that were developed to elicit information related to our hypotheses while providing flexibility for respondents to extend the direction of the conversation in directions that might add depth or breadth to our intentions for Study 2.

Sample

Our sample goal for Study 1 was to glean insights from a small number of professionals who would be knowledgeable about their organization's analytics needs. Because we knew such people within our university's alumni base as well as our own personal networks, we employed a judgment sampling approach. This non-probability method is appropriate when researchers believe they can hand-select sample elements that meet the requirements of the study and represent a larger, target population (Brown & Suter, 2014; Hair et al., 2017). Accordingly, we performed ten interviews with management-level employees, representing several industries, and who have familiarity with the analytics needs and applications of their employers.

Study 2: Survey

Research Design and Procedures

We developed a web-based survey using the Qualtrics platform. Relying on takeaways from Study 1, we developed questions in four general areas, which tie back to our research questions. Those four areas are:

- Perceptions of the value of analytics curricula/degrees (Hypotheses 1 and 2)
- Importance of various analytics skills and the level of preparedness of new hires (Research Questions 1 and 2)
- Necessity analytics courses and skills to include in the graduate business curriculum (Research Question 3)
- Approaches to analytics training/education at the respondents' organizations (Research Question 4)

Sample

We incorporated two non-probability sampling approaches in an effort to broaden the reach of our web-based survey. Having identified several appropriate respondents in Study 1, we reapproached them for Study 2 and, employing a snowball approach, asked them to provide the survey link to other professionals who would be well-informed on the analytics needs in their workplaces. Additionally, we used a convenience approach by making posts on our LinkedIn

pages where those who viewed our posts and were interested could self-select into the sample if they were informed about the analytics needs in their organizations. While these two approaches do not produce a representative sample, convenience sampling allowed us to reach a large audience in a short amount of time, and snowballing helped us provide our survey to members of a hard-to-reach population (Brown & Suter, 2014; Hair et al., 2017). Seventy-seven individuals began the survey, and our final sample was comprised of 70 people after cleaning.

Due to the nature of the non-probability sampling approaches employed, our sample was dominated by alumni from our own institution. While there was limited diversity in terms of business school represented, there seemed to be diversity in roles and industries represented in the sample. For a summary of the industries and roles of survey respondents, please see Table 1. Overall, various industries and business roles were represented in the survey.

Table 1. Industries and Roles of Survey Respondents

A. Industries represented by survey respondents

Industry	% of Respondents
Finance	26.8
Professional and Business Services	18.3
Technology	9.9
Manufacturing	5.6
Real Estate	5.6
Transportation and Utilities	5.6
Healthcare	4.2
Non-profit	2.8
Education	1.4
Leisure & Hospitality	1.4
Retail	1.4
Other	16.9

B. Department roles of survey respondents

Department	% of Respondents
Accounting	15.5
Marketing	14.1
Finance	12.7
Analytics	11.3
Senior Management / Owner	11.3
HR / Talent Acquisition	9.9
Sales	7.0
Risk Management / Compliance	5.6
Other	12.7

Measures

Using the direction provided by the interviewees, we developed our own Study 2 measures, which are explained below. These measures were assessed using 5-point Likert scales:

- *Desirability of graduate degree*. Five items with scale points ranging from "Not desirable at all" to "Extremely desirable."
- *Importance of new hires having analytics skills and the level of preparedness of new hires*. Eight items with scale points ranging from "Not important at all" to "Extremely important." The same eight items with scale points ranging from "Not prepared at all" to "Extremely prepared."

- *Necessity of graduate analytics courses*. Eleven items with scale points ranging from "Not necessary at all" to "Extremely necessary."
- *Importance of graduate programs teaching specific analytics skills*. Eight items with scale points ranging from "Not at all important" to "Extremely important."

To allow respondents to describe the extensiveness of their organizations' analytics trainings, we developed a 6-point Likert scale with points ranging from "We don't offer any analytics training" to "We offer extensive analytics training."

We also collected various demographic and classification data, such as industry, job title, and highest level of education completed. We collected the information to learn about the survey respondents and also were curious if any specific demographic patterns stood out. However, no specific demographic pattern was observed in our sample. To test our hypothesis, we applied analysis of variance (ANOVA) with post-hoc analysis (Tukey HSD) (Abdi & Williams, 2010). We performed the calculation using SPSS. We used the significance level (α) of 0.05 for hypothesis testing. For multiple hypothesis testing, we applied the Bonferroni correction to the significance level. (Weisstein, n.d.).

RESULTS

Study 1: Informational Interviews

We found three themes to be prevalent in our informational interviews. The importance of data visualization was the most common theme, being present in nine of the ten interviews. Visualization was often mentioned in conjunction with the ability to communicate takeaways in terms that someone less familiar with analytics methods could easily absorb. In other words, an analyst should be able to tell the story with visualized data, explaining what is happening and projecting what may come.

The importance of visualization connects to the second prevalent theme, which might be labeled as developing an analytical mindset. Interviewees regularly emphasized the importance of seeing the data in its broader context, working with data within the bigger picture, and understanding how results impact business decisions. One interviewee reinforced this point in the context of graduate business programs, stating that since an MBA program should prepare students for real-world employment, any analytics curriculum should, likewise, prepare students to be able to manage and analyze real-world data and solve real-life cases, when possible. Similarly, another interviewee mentioned that computer programming was quite secondary to "big picture visualization and project management." Yet another spoke to their desire to have "thinkers and questioners" - not just number crunchers.

The third common theme was the need for Excel proficiency. While not the most sophisticated tool for data analysis, it is the most ubiquitous data storage and management tool among businesses and is foundational to the analysis process. One interviewee noted that most data begin in Excel – whether it is internal data or a file received from a client. Because the data analysis process so often begins in Excel, it is important for people to be able to work with data while still in that format.

We also note that an undertone in the interviews was the sentiment that analytics curricula in graduate programs bring value to the workplace even when a company has its own training program. As stated by one interviewee, "Repetition produces fluency." Knowing a job candidate has been exposed to a wide array of scenarios, business problems, and data types indicates that this candidate may be ready to learn from further analytics training the company has for its own analytics approaches and tools.

In summary, our interviewees believed analytics curricula would add value to graduate business degrees. They felt that today's recent graduates could have been better prepared, and several were developing their own analytics training programs for their new hires. However, the training during the onboarding of new hires was not seen as a replacement for the training that students could receive during their graduate business studies. Rather, the two are complementary, and the breadth and depth of analytics experiences in a master's education allow businesses to use their own programs to fine-tune employee skills and ramp up those employees more quickly.

Study 2: Survey

(1) Perceptions of the value of analytics curricula/degrees (Hypotheses 1 and 2)

Hypothesis 1 predicted that respondents would find an MBA degree with an analytics concentration more valuable than an MBA degree alone. Hypothesis 2 stated that respondents would find a dual master's degree (MBA plus Master

in Analytics) more valuable than an MBA degree alone. We tested these hypotheses using a repeated-measures ANOVA, incorporating a Tukey HSD post hoc analysis due to the multiple comparisons. The results (Table 2), show that survey respondents rate MBA with a concentration in Data Analytics (3.71 on a scale of 1 to 5) and a Dual Master's degree of business administration and analytics (3.75) significantly higher than an MBA degree (2.94). The results support both Hypotheses 1 and 2.

Table 2. Survey respondents' rating of graduate degrees

Degree	N	Mean rating
1) MBA alone	52	2.94
2) MBA with analytics concentration	51	3.71
3) Dual MBA and Master in Analytics	51	3.75
4) Master in Analytics alone	52	3.58

ANOVA p-value < 0.001

Post-hoc analysis p-value by Tukey HSD

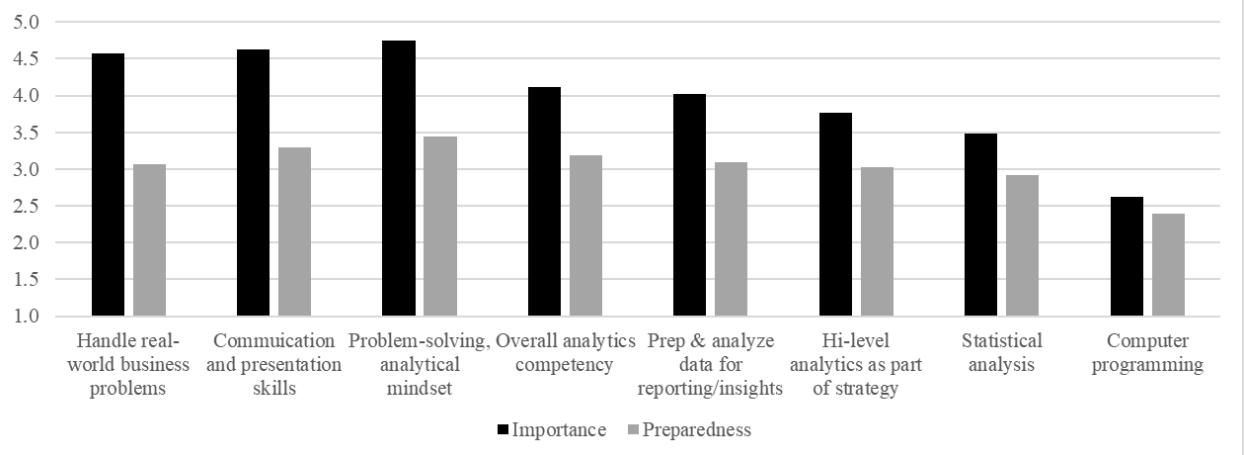
Degree	1	2	3
2	.002 *		
3	.001 *	.998	
4	.014	.928	0.854

* Statistically significant at Bonferroni corrected significance level of 0.05

(2) Importance of new hires having analytics skills and the level of preparedness of new hires (Research Questions 1 and 2).

In addition to our two hypotheses, we investigated other questions of interest. Firstly, we asked respondents how important they believed various analytics skills to be as well as how prepared their new hires were to use such skills. Figure 1 shows the gap between the importance of each skill and how prepared new hires are to perform with such skills.

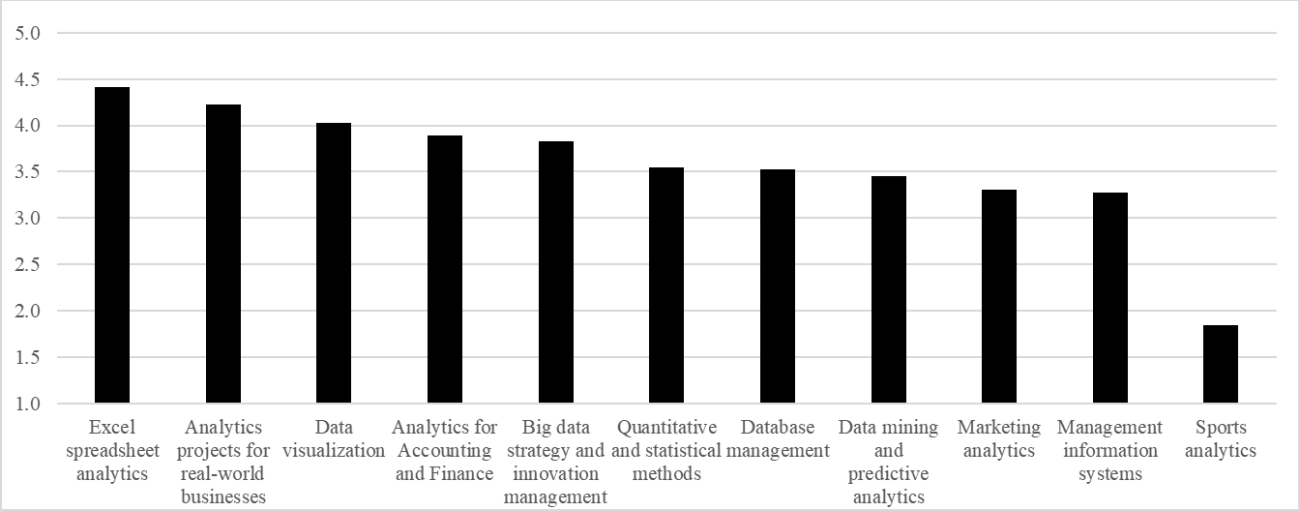
Figure 1. Importance of analytics competencies and the level of preparedness, sorted by size of gap



As seen above, there is a considerable gap between importance and preparedness in many of the skills, with the largest gap being the ability to handle real-world business problems. This finding underscores the need for a graduate analytics education to focus on contemporary business issues that would be relevant in a wide variety of contexts or industries. The second-largest gap is in communication and presentation skills. Once again, our findings highlight the importance that employers place on the soft skills that should complement hard skills. When developing a graduate-level business analytics curriculum, we recommend faculty and administrators use cases and real-world data sources and give students meaningful opportunities to strengthen soft skills alongside their developing hard skill set.

(3) *Necessity of graduate analytics courses and specific analytics skills (Research Question 3)*.
Next, we measured how important specific analytics courses and course content were to respondents. Looking at the top three items, the results indicate that professionals see value in courses that focus on or include Excel-based analytics, real-world analytics projects, and data visualization. Again, we note the importance to our respondents of the pairing of soft and hard skills. Additionally, these three top course topics match the three most prevalent themes in the informational interviews discussed earlier. The averages for all courses/course content are found in Figure 2.

Figure 2. Necessity of specific analytics courses for graduate business students



We next asked respondents for their input on the importance of graduate programs teaching specific technical skills. Excel was the clear top skill, followed by data visualization and statistical analysis. A part of the low importance evaluations for robotic process automation and SPSS may be that many respondents were unfamiliar with these terms, as 15 and 14 people, respectively, did not provide responses for those items.

Figure 3a. Importance of specific analytics skills for graduate business students

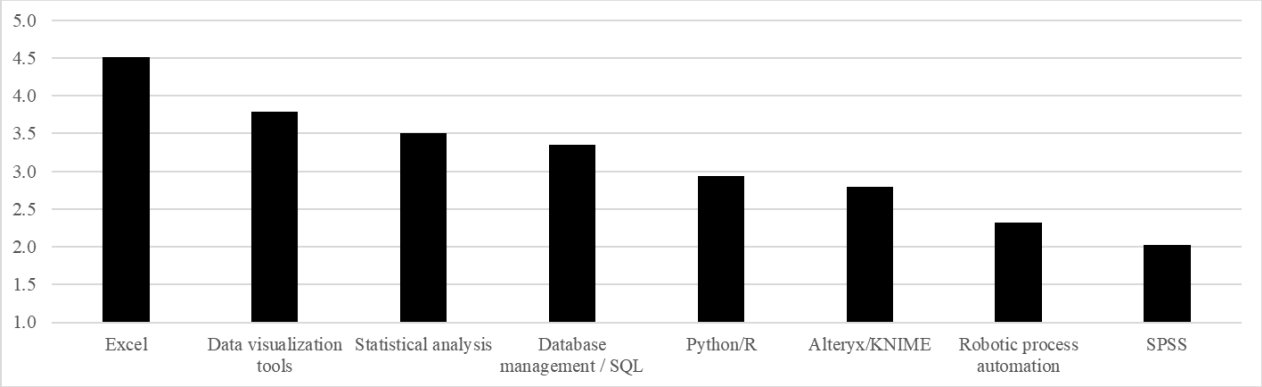
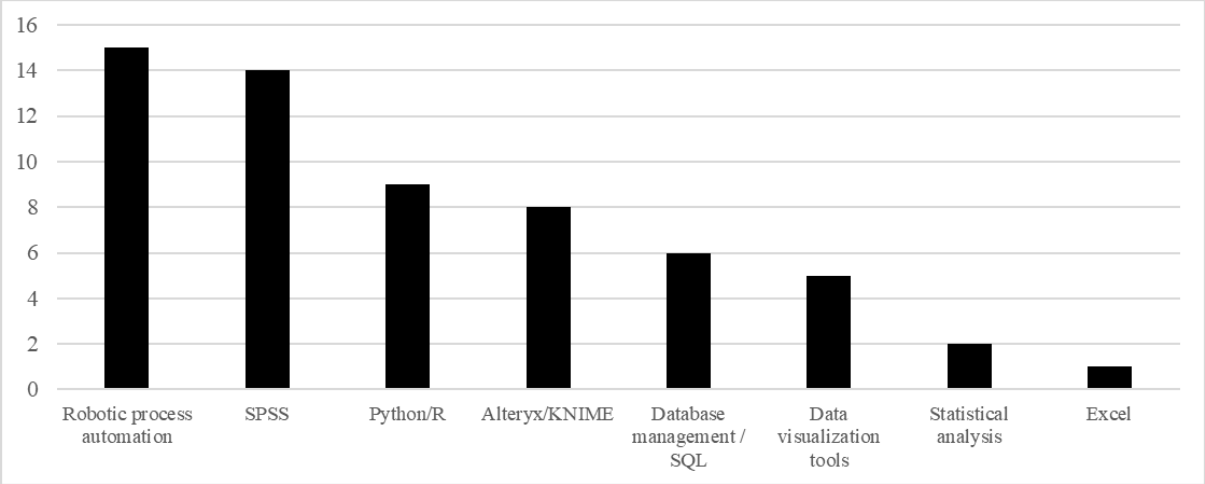
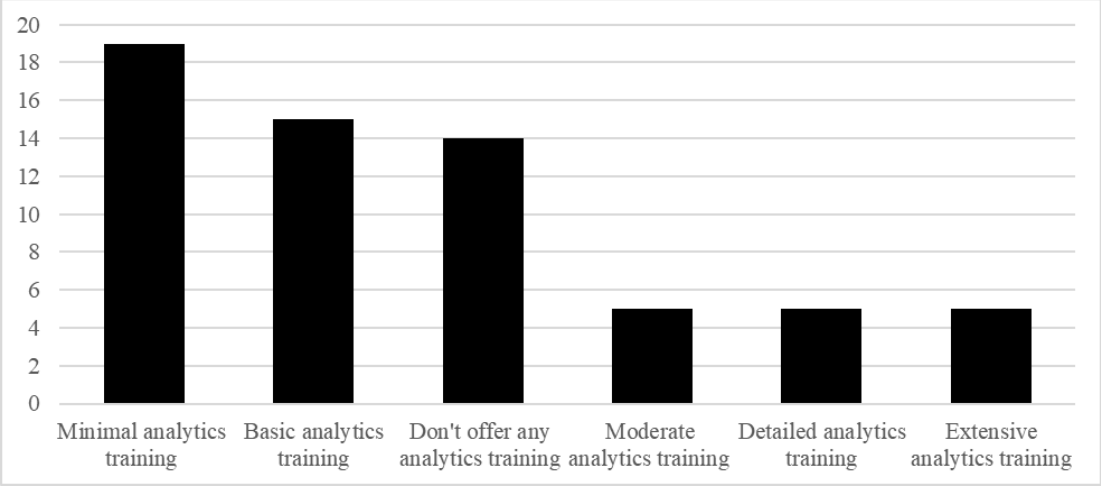


Figure 3b. Number of non-responses for specific analytics skills for graduate business students



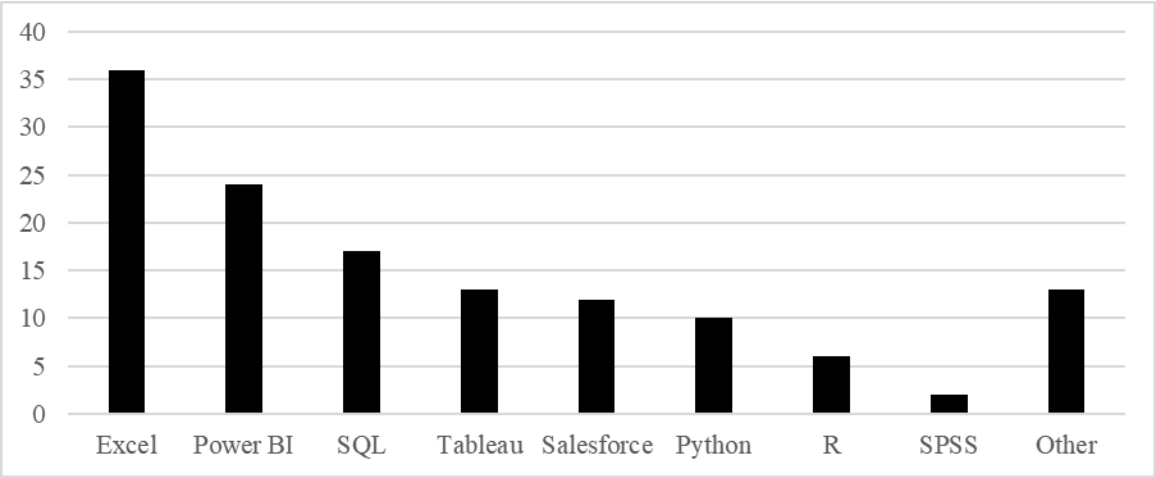
(4) *How much on-the-job analytics training do companies offer to new hires (Research Question 4)*.
Lastly, we sought to understand the extent to which organizations are meeting their analytics needs through in-house training. As seen in the chart below, most respondents indicated a low level of analytics training. Measured on a 6-point Likert scale, the response mean is 2.73. These results may indicate the extent to which employers wish to rely on candidates who can come into their jobs with a strong foundation of analytical skills. If so, graduate business programs that can make known their emphasis on developing real-world analytical skills could become high-demand recruiting grounds for the many organizations that have chosen to invest minimally in their own training.

Figure 4. The extent of on-the-job training for analytics



Following up the training question, we asked for the skills in which the respondents' organizations were training their employees. We provided eight options plus an "other" option in which respondents could type a skill or program. Consistent with our earlier findings on the importance of Excel, the spreadsheet app and Power BI were the top skills taught in-house. From the 13 respondents who wrote in other skills, Alteryx was the most common skill, being listed six times.

Figure 5. Analytics topics offered by companies in the on-the-job training



CONCLUSIONS

In this post-pandemic world where the value of graduate business education is questioned, in this research, we set out to investigate employers' perception of MBA value. Specifically, as there is a tremendous enthusiasm for data analytics and artificial intelligence in the business world today, we seek to understand if incorporating data analytics can increase the perceived value of a graduate business degree. Both our informational interviews and surveys showed that employers perceive adding a Concentration or a Dual degree in Analytics can add value to an MBA degree.

Further, our studies provided insights on specifically what to include in a graduate analytics curriculum. Our results indicate that Excel remains a foundational piece of quantitative analysis work, and spreadsheet skills remain an important tool in an analyst's toolkit. But while hands-on skills are necessary, managers want to know that their new hires can see the data in the larger business context and make good business decisions with them, especially for those receiving graduate-level business education. Additionally, proficiency in data visualization and explaining results are highly valued.

Many organizations offer modest analytics training, and it appears that managers see graduate-level analytics curricula as important foundations that businesses can build upon. Given this and our other takeaways, business schools should continue to invest in the analytics components of their graduate programs to ensure they help students develop hands-on skills, understand the business value of analytics, find and visualize the most meaningful results, and use data to improve business-decision effectiveness.

Future studies should be conducted to address some unanswered questions from this study. In line with the study results, our business school has developed a graduate-level Data Analytics concentration including the following courses: Analytics Concepts and Consulting, Data Visualization, Analytics for Accounting and Finance, and Big Data Strategy. Excel is covered in the required graduate curriculum. It would be interesting to know whether having this Concentration indeed helps with students' skill improvement and employment opportunity as value-adding to their MBA degree (Bruce and Edgington, 2008). It would also be of interest to study how to design a Dual Master's degree in business administration and analytics; what courses should be required and how to most effectively structure the dual degree curriculum. Further, all of the informational interviews and most of the survey data of this study was collected before generative artificial intelligence became widely available; it would be of interest to know how generative artificial intelligence can play a role in graduate business education.

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Kevin Pan, Ph.D., is an associate professor of quantitative analysis at the Brock School of Business at Samford University. He received a Bachelor of Science in Electrical Engineering from National Taiwan University, a Master of Science in Electrical Engineering and a Ph.D. in Biomedical Informatics from Stanford University. His research interests include data analytics, business education, and the integration of faith and learning.

C. Clifton Eason, Ph.D. is an associate professor of marketing and the coordinator of the professional sales program in Samford University's Brock School of Business. His teaching portfolio includes courses in Marketing Strategy, Analytics, Sales, and Customer Relationship Management. In addition to his instructional responsibilities in the Brock School, Clif maintains an active practitioner-focused research agenda covering the areas of customer experience, sports marketing, locally-owned businesses, and other timely trends and topics in marketing.

Bayleigh Garmon is an alumna of Samford University, where she graduated with dual degrees in business management and marketing with a concentration in data analytics. She is a digital merchandiser at Shipt, where she applies data analytics daily. She is interested in researching how data analytics education prepares business graduates for career success.

Bailey Spaulding is an alumna of Samford University, where she graduated with a degree in marketing with a concentration in data analytics. She is a marketing coordinator at the University of Notre Dame. She is interested in researching how learning data analytics skills affects business students' future employment opportunities.

Manuscript Guidelines, Submission and Review Process

TOPIC AREAS (BUT NOT LIMITED TO THESE):

- Course design – current courses, new courses, new trends in course topics
- Course management – successful policies for attendance, homework, academic honesty …
- Class material
  - o Description and use of new cases or material
  - o Lecture notes, particularly new and emerging topics not covered effectively in textbooks
  - o Innovative class activities and action-learning – games, active learning, problem based
- Major or emphasis area program design that is new or innovative.
- Assessment – all aspects including AACSB and university level assessment strategies and programs
- Integration of programs or courses with other academic disciplines
- Internship programs
- Business partnerships
- Successful student job placement strategies
- Any topic that relates to higher education business education.

SUBMISSION AND REVIEW PROCESS:

Copyright

- Manuscripts submitted for publication should be original contributions and should not be under consideration with another journal.
- Authors submitting a manuscript for publication warrant that the work is not an infringement of any existing copyright, infringement of proprietary right, invasion of privacy, or libel and will indemnify, defend, and hold Elm Street Press harmless from any damages, expenses, and costs against any breach of such warranty.

Prepare your manuscript

- See the Style Guideline page for specific instructions.
- Articles must make a contribution to business education innovation.
- Manuscripts can be any length. The first 10 pages are charged the current per page rate, and pages over 10 are charged half that rate.
- Articles can be either regular research papers, or shorter notes that succinctly describe innovative classroom teaching methods or activities.
- Manuscripts should be completely finished documents ready for publication if accepted.
- Manuscripts must be in standard acceptable English grammatical construction.
- Manuscripts should be in MS Office Word format. Word 2007 files are acceptable, as are earlier versions of Word. If you are using a new version of Word after Word 2007, save in Word 2007 format.

Submit your manuscript

- Manuscripts may not have been published previously or be under review with another journal.
- Submit the manuscript attached to an email to **submit@beijournal.com**
- We will respond that we have received the manuscript.
- Article submissions can be made at any time.
- Submission deadlines: September 15 for December issue, March 15 for June issue.

Manuscript review

- The editor and reviewers will review your submission to determine if 1) the content makes a contribution to innovative business education, 2) is of the proper page length, 3) is written in proper grammatical English, and 4) is formatted ready for publication.
- Submissions not meeting any of these standards will be returned. You are invited to make revisions and resubmit.
- If the submission meets the standards, the manuscript will be sent to two reviewers who will read, evaluate and comment on your submission.
- The editor will evaluate the reviews and make the final decision. There are 3 possible outcomes:
    - Accept as is.
    - Accept with minor revisions.
    - Not accepted.
- Reviews will be returned promptly. Our commitment is to have a decision to you in less than two months.
- If your paper is not accepted, the evaluation may contain comments from reviewers. You are invited to rewrite and submit again.

If your paper is accepted

- Minor revision suggestions will be transmitted back to you.
- Revise and send back as quickly as possible to meet printer deadlines.
- Upon final acceptance, we will bill you publication fees. See www.beijournal.com for latest per page fees. Sole author fees are discounted.
- The fees include all costs of mailing a copy of the issue to each author via standard postal ground.
- Delivery to locations outside the continental US will cost an additional $10 per author for 5 day delivery.
- Faster delivery methods are available for US and international delivery. Contact the editor for a specific pricing.
- All publication fees should be remitted within 10 business days of acceptance, if possible.
- If you decide not to publish your paper with BEI Journal after submitting payment, we will refund publication fees less $200 to cover costs of review and processing.
- Cancellation cannot occur after the paper has been formatted into the final printer's file.

Manuscript Style Guide and Example

An example is provided following these instructions.
This style guide represents style guidelines in effect for future issues, but always check for updates online.
Authors are responsible for checking for correct grammar, construction and spelling. Authors are also responsible for formatting pictures, tables, and figures such that a pdf black and white file sent to the publisher will reproduce in a readable manner.

General Setup:

- All fonts other than exceptions noted below: Times New Roman. 10 point for text. Other sizes as noted below
- Margins: 1 inch on all sides of 8½x11 inch paper size.
- No headers or footers.
- Absolutely no footnotes or endnotes via footnote or endnote formatting. For footnotes or endnotes, place a number of the footnote in the proper location as a superscript. Then at the end of the paper or bottom of the page, add the footnote as text with a superscript number to correspond to that footnote.
- Page numbering bottom centered.
- No section breaks in the paper.
- No color, including url's. Format to black. No color in tables or figures. Use shading if necessary.
- All pages must be portrait orientation. Tables and figures in landscape orientations should be reformatted into portrait orientation.
- All paragraphs should be justified left and right, single spaced, in 10 point Times font, no indent on first line, l line between each heading and paragraph.
- One line between each paragraph.

Titles, Authors, and Headings:

- **Title centered 14 point bold**. One line between title and author's name.
- Authors: centered, 12 point. Name, affiliation, state, country.
- One line space to **ABSTRACT** (title 10 point, bold, all capitalized, aligned left; text of abstract 10 point, no bold)
- After **ABSTRACT**, one line space, then **Keywords**. Followed by one line space to first major heading.
- **HEADINGS, MAJOR**, 10 point, bold, all capitalized, aligned left.
  The specific headlines will be based on the content of the paper, but major sections should at a minimum include an abstract, keywords, introduction, conclusion, and references.
- **Sub-headings**: 10 point, bold, first letter capitalized, no line to following paragraph. Align left.
- *Third level headings: Italic*, 10 point, first letter capitalized, no line to following paragraph. Align left.
- **Keywords:** heading: 10 point, bold, first letter capitalized, no line to following paragraph. Align left. Your list of keywords in 10 point, no bold.

Tables, Figures and Graphs:

- All fonts 10 point.
- Numbered consecutively within each category. Table 1, Figure 1 etc.
- Title: 10 point, bold, left justify title, one space, then the table, figure, etc.
- Example: **Table 1: Statistical Analysis**

References:

- APA format when citing in the text. For example (Smith, 2009).
- References section: 8 point font, first line left margin, continuation lines 0.25 inch indent. Justify left and right. No line spacing between references. List alphabetically by first author.
- Specific references: Last name, First initial, middle initial (and additional authors same style) (year of publication in parentheses). Title of article. *Journal or source in italics.* Volume and issue, page number range.
- Example: Clon, E. and Johanson, E. (2006). Sloppy Writing and Performance in Principles of Economics. *Educational Economics*. V. 14, No. 2, pp 211-233.
- For books: last name, first initial, middle initial (and additional authors same style) (year of publication in parentheses). *Title of book in italics.* Publisher information.
- Example: Houghton, P.M, and Houghton, T.J. (2009). *APA: The Easy Way!* Flint, MI: Baker College.

Example (note that this example represents a change from previous style guides)

Evidence to Support Sloppy Writing Leads to Sloppy Thinking

Peter J. Billington, Colorado State University - Pueblo, Colorado, USA (12 point)
Terri Dactil, High Plains University, Alberta, Canada

ABSTRACT (10 point, bold, all capitalized, left justified)

(text: 10 point Times font, no indent, justified, single space, 150 words maximum for the abstract)
The classic phrase "sloppy writing leads to sloppy thinking" has been used by many to make writers develop structured and clear writing. However, although many people do believe this phrase, no one has yet been able to prove that, in fact, sloppy writing leads to sloppy thinking. In this paper, we study the causal relationship between sloppy writing and sloppy thinking.

Keywords: sloppy writing**,** sloppy thinking **(10 point, bold title, first letter capitalized, left justified).**

INTRODUCTION (10 point, bold, all capitalized, left justified).

The classic phrase "sloppy writing leads to sloppy thinking" has been used by many to make writers develop structured and clear writing. However, since many people do believe this phrase, no one has yet been able to prove that in fact, sloppy writing leads to sloppy thinking. Is it possible that sloppy writing is done, even with good thinking. Or perhaps excellent writing is developed, even with sloppy thinking.

In this paper, we study the writing of 200 students that attempts to test the theory that sloppy writing leads to sloppy thinking.

PREVIOUS RESEARCH

The original phrase came into wide use around 2005 (Clon, 2006), who observed sloppy writing in economics classes. Sloppy writing was observed in other economics classes (Druden and Ellias, 2003).

RESEARCH DESIGN

Two hundred students in two business statistics sections during one semester were given assignments to write reports on statistical sampling results. The papers were graded on a "sloppiness" factor using…

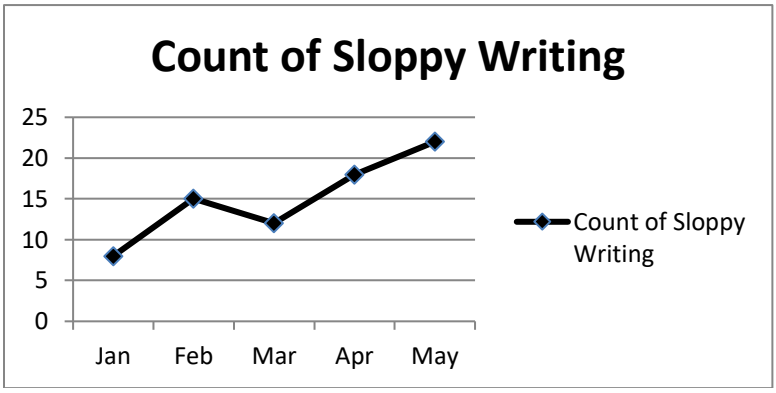
Data Collection (Sub-heading, bold but not all caps, 10 point, aligned left, bold, no line after to paragraph)
The two hundred students were asked to write 2 short papers during the semester…

Data Analysis(Sub-heading, bold but not all caps, 10 point, aligned left, bold, no line after to paragraph)
The two hundred students were asked to write 2 short papers during the semester…

DISCUSSION

The resulting statistical analysis shows a significant correlation between sloppy writing and sloppy thinking. As noted below in Figure 1, the amount of sloppy writing increases over the course of the spring semester.

Figure 1: Sloppy Writing During the Semester



The count results were compiled and shown in Table 1 below.

Table 1: Counts of Good and Sloppy Writing and Thinking (bold, 1 line after to table, left justify)

	Good Thinking	**Sloppy Thinking**
Good Writing	5	22
Sloppy Writing	21	36

*-Indicates significance at the 5% level)

As Table 1 shows conclusively, there is not much good writing nor good thinking going on.

CONCLUSIONS

The statistical analysis shows that there is a strong relation between sloppy writing and sloppy thinking, however, it is not clear which causes the other…

Future research will try to determine causality.

REFERENCES (title10 point, all caps, bold, align left, one line to first reference)
(1line spacing) (All references 8 point, indent second line 0.25 inch, justify left and right)

Clon, E. (2006). Sloppy Writing and Performance in Principles of Economics. *Educational Economics*. V. 14, No. 2, pp 211-233.

Devad, S. and Flotz, J. Evaluation of Factors Influencing Student Class Writing and Performance. *American Journal of Farming Economics*. V. 78, Issue 3, pp 499-502.

Druden, G. and Ellias, L. (1995). *Principles of Economics*. New York: Irwin.

(short bio section optional, can run longer than these examples; removed before sent to reviewers)

Peter J. Billington, Ph.D., is a professor of operations management at Colorado State University – Pueblo. His research interests include lean six sigma and innovative education.

Terri Dactil, Ph.D., is a professor of business communication in the College of Business at High Plains University, Alberta, Canada. His research interests include instructional methods to improve student communication skills.

Endnote: (do not use word footnote or endnote formatting to accomplish this; see comments above)

Build 1 on 6-4-24