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Construct a Two-Stage Case Study in an Intermediate Accounting II Course

Lei Wen, Emporia State University, Emporia, Kansas, USA

ABSTRACT

This study develops a two-stage case study in a face-to-face undergraduate intermediate accounting II course. A two-stage case study is specially designed for this course as a learning process to allow students to have individual work in the first stage. Then students experience teamwork or cooperative learning in the second stage. The research findings show that students are neutral about their experience of two-stage case study. The implementation of a two-stage case study makes students have a less positive view about the course, compared with their peers in a control group without a two-stage case study. One possible explanation could be lack of more meaningful interactive peer learning.

Keywords: Case Study, Accounting Education, Peer Learning, Cooperative Learning

INTRODUCTION

Compared to previous accounting education studies, this study creates a unique two-stage case study in a face-to-face undergraduate-level intermediate accounting II course to allow students to go through individual work in the first stage. Then students experience teamwork or cooperative learning in the second stage. This learning process of a two-stage case study provides a new perspective to investigate students' perceptions of individual active learning and cooperative learning approach in a case study setting.

LITERATURE REVIEW

Accounting professionals use both technical knowledge and "non-technical'' soft skills, such as critical thinking and communication skills to engage with their clients in current business environment (Kavanagh and Drennan, 2008; Hancock et al., 2010). Accounting education research suggests that case study can help students apply research, communication, and critical thinking skills as well as technical knowledge in accounting field to solve real-world problems (Chu and Libby, 2010). Chu and Libby (2010) ask students to write six mini-cases in a multiple-choice format at an undergraduate taxation course. Student feedback indicates the assignment of case study is an efficient learning tool and students "like this type of individual assignment more than the traditional form of assignment" (Chu and Libby, 2010).

Peer tutoring and cooperative learning are two forms of peer learning (Topping, 2005). Previous literature has mixed results about the impact of cooperative learning in accounting education (Du, 2015; Hite, 1996; Lancaster and Strand, 2001; Wen, 2017). The use of cooperative learning can be employed as one of drivers of promoting active learning when students are encouraged to show the quality and integrity of their learning (Duff and McKinstry, 2007; Wygal and Stout, 2015). By comparing a control group (without cooperative learning) to a special treatment group (with cooperative learning), Hite (1996) finds that students with cooperative learning outperformed their peers in control group on final exam at individual income tax course. Du (2015) finds that students are very favorable about the experience of cooperative learning in an introductory accounting course. Jones and Fields (2001) find that supplemental instruction (SI) improves students' academic performance in principles of accounting course. Supplemental instruction (SI) is "a proactive educational intervention program employing team-learning techniques" (Jones and Fields, 2001). Bay and Pacharn (2017) examine the effectiveness of cooperative learning pedagogical methods in a graduate-level intermediate accounting course and report that students have very positive perceptions about course experience.

Some accounting education studies do not find that the cooperative learning has positive impact on academic performance and students' satisfaction. (Gabbin and Wood, 2008; Kunkel and Shafer, 1997; Lancaster and Strand, 2001; Wen, 2017). Gabbin and Wood (2008) find no significant improvement at the comprehensive final or the cumulative individual exam scores in an intermediate accounting II class while applying cooperative learning strategy. Kunkel and Shafer (1997) do not find the use of cooperative learning has a positive impact on academic performance in an auditing class. Lancaster and Strand (2001) report that there is no academic performance

difference between lecture-based learning environment and cooperative learning environment in a managerial accounting class. Wen (2017) finds that the use of cooperative learning does not have a favorable impact on students' satisfaction at an undergraduate intermediate accounting II course. A cooperative learning method applied at an intermediate accounting II course does not create a more active class participation and engaging learning environment (Wen, 2017).

A free-rider problem negatively affects the cooperative learning environment and decrease the engagement of peer learning. There are different ways and techniques to design groupwork settings to increase the interactive peer learning and reduce the free-rider problems. Lambert et al. (2014) use wiki, a group assessment tool, to create a more objective grading system in auditing assignments to solve the free-rider problem in the evaluation of groupwork. Bay and Pacharn (2017) indicate that a free-rider effect and the negative behaviors associated with cooperative learning environment only temporarily occur in the beginning of their study. McGuigan et al. (2014) develop an instructional case and use the detailed group learning procedures, rules, and guidelines to control the free-riders and the negative behaviors in an introductory accounting course at a University in New Zealand. Three hundred and ninety-nine respondents in the study of McGuigan et al. (2014) rank "learn from group members" is the No. 1 factor among 16 variables related to "positive impact of groups on their development". Sudhakar et al. (2016) use an online peer review forum to facilitate peer learning to enhance student experience and performance at an introductory accounting course.

A successful cooperative learning requires the achievements of following components, "individual contribution to teamwork, active self-learning, interactive peer learning, accountability of individual member, responsible grading system, and social communication skills" (Du, 2015; Lambert, et al., 2014; Johnson and Johnson, 1999; Johnson and Johnson, 2009). Missing one or more components during the designing and implementation of a cooperative learning project may lead to a negative impact on student engagement, experience, and satisfaction. In summary, cooperative learning is more than just to put students to "working together" and leave them alone (Topping, 2005). The "structuring positive interdependence" (Slavin, 1990) is needed for students to achieve "specific shared goal or output" (Topping, 2005). Topping (2001) suggests considering twelve components to carry out peer learning, including "process monitoring, assessment of students, evaluation, and feedback."

RESEARCH METHOD

In this study, two stages of a case study are used in an intermediate accounting II course in Spring 2019. The same case is used to assess students' ability to do accounting research in two different learning environments. In stage one, each student is required to submit an individual written report on Canvas. A student would receive two grades for this case study. One grade is given to each student for individual work in stage one. Another grade is based on a team report submitted in stage two. The intention is to solve the free-rider problem and encourage more meaningful interactive peer learning in stage two. Team members need to discuss their individual work to find best solutions of the case study to get a good team-report-grade. All students are randomly assigned to a team via Canvas. Each team is required to submit a team written report on Canvas. Each team has three members. Canvas, an online learning course management system used at the author's university, is employed to randomly select each group member after all students submit their individual written reports. Students do not know who their group members will be, which prevents students from working with their potential group members in advance. There are seven groups for this study. All team members in a same team would have the same grade for a team-written-report.

This case requires all students to use the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Professional View Database to finish two reports. For both stage one and stage two, there are same requirements for an individual written report and a team written report. Students must integrate ASC quotes and related discussions of the case study to show how to make a final decision. Students should list all ASC quotes they use and integrate ASC quotes into explanations and analysis in a written case report. A written report for case study is required for all groups. The case study report includes an analysis of how to recognize revenue by applying the five-step process set forth in ASC 606-10-05-4 (Codification Reference). This course-embedded case assignment is from the Deloitte Trueblood Accounting and Auditing Case Study Dataset.

Course-learning objectives, content and designing structures are similar at both classes in different two semesters, including the course syllabus, end-of-chapter homework exercise assignments, and quizzes. Both classes are offered via traditional in-class face-to-face teaching delivery method. Most of the students are traditional students. The author's institution is an AACSB-accredited business school at a regional public university. At the end of semester,

the IDEA survey, a course evaluation tool, is conducted for both accounting classes. The assessment of course objectives, student learning outcomes and student satisfaction are used to measure the course learning effectiveness related to the cooperative learning approach.

Spring 2019 class is designed as a special treatment group for this project with the structured team-based case study, a type of cooperative learning. More specially designed questions related to this study are added in IDEA survey at the end of Spring 2019 semester to measure students' perceptions of using a case study. Fall 2018 class is used as a control group (without a two-stage case study). Spring 2019 class is designed as a special treatment group with the use of a two-stage case study. 5-point Likert scale is used to measure how respondents agree or disagree questions or statements on the IDEA course evaluation survey. A score of 5 indicates strong agreement with the statement. A score of 3 indicates a neutral feeling with the statement. A score of 1 indicates strong disagreement with the statement. All following data and results are from the IDEA survey.

RESULTS

In Fall 2018, 18 out of 18 students respond to all questions on the IDEA survey. The response rate is 100%. In Spring 2019, 20 out of 21 students respond to all questions on the IDEA survey. The response rate is 95%. Some evidence of learning effectiveness can be noticed through the descriptive statistics report of some selected data from the IDEA survey in table one.

Table 1: Descriptive Statistics of Some Selected Data Related to Student Ratings of Learning on Relevant Course Objectives

Students in Fall 2018 (without a case study) participate in survey (n = 18)

Students in Spring 2019 (with a case study) participate in survey (n = 20)

	Fall 2018		Spring 2019	
	Mean	Standard Deviation	Mean	Standard Deviation
Gaining a basic understanding of the subject (e.g., factual knowledge, methods, principles, generalizations, theories)	4.17	0.90	3.75	0.83
Learning to apply course material (to improve thinking, problem solving, and decisions)	4.06	1.08	3.80	0.98
Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course	4.00	1.00	3.75	0.94
Learning appropriate methods for collecting, analyzing, and interpreting numerical information	4.28	1.04	3.90	0.94
Average	4.13	1.01	3.80	0.92

In general, table one demonstrates that students have more positive views about four course learning objectives at this upper-level accounting course in Fall 2018. In Fall 2018, the average value of the student response to "gaining a basic understanding of the subject (e.g., factual knowledge, methods, principles, generalizations, theories)" is 4.17 and the standard deviation is 0.90. In Spring 2019, the average value of the same question is 3.75 and the standard deviation is 0.83. In Fall 2018, the average value of the student response to "learning to apply course material (to improve thinking, problem solving, and decisions)" is 4.06 and the standard deviation is 1.08. In Spring 2019, the average value of the same question is 3.80 and the standard deviation is 0.98.

In Fall 2018, the average of four mean values related to these four course objectives is 4.13. In Spring 2019, the average of four mean values related to these four course objectives is 3.80. In a conclusion, students have less favorable views about their progress, which is aligned with four course objectives.

Table 2: Descriptive Statistics of Some Selected Data Related to Students' Perceptions of Their Learning

	Fall 2018	Spring 2019
	Mean	Mean
Reflective and Integrative Learning		
Encouraged students to reflect on and evaluate what they have learned	4.4	4.0
Stimulated students to intellectual effort beyond that required by most courses	4.4	4.0
Related course material to real life situations	4.3	4.0
Created opportunities for students to apply course content outside the classroom	3.9	3.6
Collaborative Learning		
Asked students to help each other understand ideas or concepts	3.7	3.6
Active Learning		
Involved students in hands- on projects such as research, case studies, or real life activities	3.0	3.5
Average	3.95	3.78

Table two shows that mean value of the students' thoughts about reflective and integrative learning, cooperative learning and active learning for this undergraduate-level accounting course. In Fall 2018, the average value of the student response to "encouraged students to reflect on and evaluate what they have learned" is 4.4. In Spring 2019, the average value of the same question is 4.0. In Fall 2018, the average value of the student response to "stimulated students to intellectual effort beyond that required by most courses" is 4.4. In Spring 2019, the average value of the same question is 4.0.

The mean value of the students' opinions about collaborative learning (asked students to help each other understand ideas or concepts) is 3.7 in Fall 2018. The mean value of the students' opinions about collaborative learning is 3.6 in Spring 2019. The findings indicate that the use of case study in stage two as a method of collaborative learning in Spring 2019 did not achieve the expected result to improve peer learning. The mean value of the students' opinions about active learning ("involved students in hands-on projects such as research, case studies, or real life activities") is 3.0 in Fall 2018. The mean value of the students' opinions about active learning is 3.5 in Spring 2019. The findings indicate that the use of case study in Spring 2019 did improve active learning. The average of the mean value of the students' thoughts about reflective and integrative learning, collaborative learning and active learning decreases significantly from 3.95 in Fall 2018 to 3.78 in Spring 2019.

Table 3: Descriptive Statistics of Some Selected Data Related to Instructor's Teaching Procedures

	Fall 2018		Spring 2019	
	Mean	Standard Deviation	Mean	Standard Deviation
Formed teams or groups to facilitate learning	2.56	1.50	3.15	1.01
Involved students in hands--on projects such as research, case studies, or real life activities	3.00	1.56	3.60	1.32
Asked students to share ideas and experiences with others whose backgrounds and viewpoints differ from their own	3.39	1.57	3.35	1.39
Asked students to help each other understand ideas or concepts	3.72	1.28	3.55	1.02
Acquiring skills in working with others as a member of a team	2.94	1.51	3.05	1.07
Average	3.12	1.48	3.34	1.16

Table three shows that mean value of the students' thoughts about instructor's teaching procedures. In Fall 2018, the average value of the student response to "formed teams or groups to facilitate learning" is 2.56 and the standard deviation is 1.50. In Spring 2019, the average value of the same question is 3.15 and the standard deviation is 1.01. In Fall 2018, the average value of the student response to "involved students in hands--on projects such as research, case studies, or real-life activities" is 3.00 and the standard deviation is 1.56. In Spring 2019, the average value of the same question is 3.60 and the standard deviation is 1.32.

In Fall 2018, the average value of the student response to "asked students to help each other understand ideas or concepts" is 3.72 and the standard deviation is 1.28. In Spring 2019, the average value of the same question is 3.55 and the standard deviation is 1.02. In Fall 2018, the average value of the student response to "acquiring skills in working with others as a member of a team" is 2.94 and the standard deviation is 1.51. In Spring 2019, the average value of the same question is 3.05 and the standard deviation is 1.07.

In summary, these results suggest that the implementation of a cooperative learning tool in this upper-level accounting course does not increase student peer learning engagement and experience. Respondents do not feel that a case study as a forum of cooperative learning in Spring 2019 substantially improves their knowledge, skills, and abilities.

Table 4: Descriptive Statistics of Some Selected Data Related to Students' Perceptions of The Course

	Fall 2018		Spring 2019	
	Mean	Standard Deviation	Mean	Standard Deviation
As a rule, I put forth more effort than other students on academic work.	3.89	0.87	3.95	0.8
When this course began I believed I could master its content.	3.72	0.93	4.00	0.89
Overall, I rate this instructor an excellent teacher.	4.33	0.94	3.9	1.09
Overall, I rate this course as excellent.	3.94	1.03	3.6	1.11

Table four indicates that students feel that they put more efforts. The mean score for the statement that "As a rule, I put forth more effort than other students on academic work" is 3.89 in Fall 2018 and 3.95 in Spring 2019 on a 5-point Likert scale. A score of 5 indicates strong agreement with the statement. A score of 3 indicates a neutral feeling with the statement. In Fall 2018, the average value of the student response to "Overall, I rate this instructor an excellent teacher" is 4.33 and the standard deviation is 0.94. In Spring 2019, the average value of the same question is 3.9 and the standard deviation is 1.09.

In Fall 2018, the average value of the student response to "Overall, I rate this course as excellent" is 3.94 and the standard deviation is 1.03. In Spring 2019, the average value of the same question is 3.6 and the standard deviation is 1.11. This study makes a comparison between a control group (without a two-stage case study) and a special treatment group (with a two-stage case study). Students with the experience of a two-stage case study in Spring 2019 have less positive views about the course and less favorable perceptions about their instructor's teaching effectiveness for the course, compared with their peers in control group without a two-stage case study in Fall 2018.

One of possible attributes about significant decline in students' perceptions toward the instructor and course could be that students do not enjoy the experience of the cooperative learning approach. Since this upper-level accounting course is very challenging and difficult, students could feel much comfortable to work in a more active individual learning platform via self-learning. Without using the cooperative learning, students could have a much better control in time management and flexibility.

In Spring 2019, the average value of the student response to "Accounting Standards Codification (ASC) case study helps me better understand Open vs. Closed Systems. An open system is one where the actors in the system affect their environment and are affected by their environment in return. A closed system is one where the actors in the

Table 5: Descriptive Statistics of Some Selected Data Related to Students' Perceptions of a Case Study in Spring 2019

	Spring 2019
	Mean
Accounting Standards Codification (ASC) case study helps me better understand Open vs. Closed Systems. An open system is one where the actors in the system affect their environment and are affected by their environment in return. A closed system is one where the actors in the system are isolated from their environment.	3.00
This combination of individual work and teamwork for ASC case study is a good method to learn Open vs. Closed Systems.	3.05
Overall, I rate this ASC case study as a good experience.	3.10
My interactions with group members in the ASC case study improve my understanding of the revenue topic.	2.80
The experience of ASC case study improves my satisfaction about this class.	3.00
Average	2.99

system are isolated from their environment" is 3.00. In Spring 2019, the average value of the student response to "This combination of individual work and teamwork for ASC case study is a good method to learn Open vs. Closed Systems" is 3.05. In Spring 2019, the average value of the student response to "Overall, I rate this ASC case study as a good experience" is 3.10. In Spring 2019, the average value of the student response to "My interactions with group members in the ASC case study improve my understanding of the revenue topic" is 2.80. In Spring 2019, the average value of the student response to "The experience of ASC case study improves my satisfaction about this class" is 3.00. The results clearly demonstrate that students have less favorable evaluation about this cooperative-learning-based case study.

Table five shows mixed results about the impact of this cooperative-learning-based case study in Spring 2019. Among 20 respondents, only 2 respondents (10% of students) respond to "My interactions with group members in the ASC case study improve my understanding of the revenue topic" as "Strongly Agree", the highest rank in 5-level scales. 6 respondents (30% of student) describe it as "Agree", the second-highest rank in 5-level scales. 2 respondents (10% of student) are neutral about this survey question. 6 respondents (30% of students) respond to the same question as "Disagree". 4 respondents (20% of students) respond to the same question as "Strongly Disagree". Overall, the average value is 2.80. The results clearly demonstrate that students are divided. Half of respondents are very negative about the interactive peer learning component of the cooperative learning in the case study. The lack of interactive peer learning might be one of reasons that students are neutral about this two-stage case study.

Table five also shows mixed results about the impact of this cooperative-learning-based case study on student satisfaction in Spring 2019. Among 20 respondents, only 2 respondents (10% of students) respond to "The experience of ASC case study improves my satisfaction about this class" as "Strongly Agree", the highest rank in 5-level scales. 6 respondents (30% of student) describe it as "Agree", the second-highest rank in 5-level scales. 5 respondents (25% of student) are neutral about this survey question. 4 respondents (20% of students) respond to the same question as "Disagree". 3 respondents (15% of students) respond to the same question as "Strongly Disagree". Overall, the average value is 3.00. The results clearly demonstrate that students are divided. The experience of this cooperative-learning-based case study does not increase student satisfaction.

LIMITATIONS AND CONCLUSION

One major problem for this research is that IDEA survey is an institution-controlled assessment tool. As an instructor, the author only gets a summary report instead of a more detailed dataset, which really restricts the author

from doing further basic and comprehensive statistical analysis. Another major problem for this research is sample size. Due to the class size, the author cannot increase sample size for this research. Using a larger sample from more than one institution would give the study results much stronger support.

This study finds that the use of a two-stage case study at an undergraduate-level intermediate accounting II course does not have a favorable impact on students' satisfaction about the course. A two-stage case study could reduce a free-rider problem in stage one because all team members must do their individual work. But it does not enhance a cooperative learning environment and decrease more meaningful interactive peer learning in stage two. Consistent with the study of Wen (2017), this paper also implies that accounting instructors should be very careful in adopting cooperative learning project in upper-level accounting classes. Some topics in these upper-level accounting classes are extremely technical in nature and very complex. Accounting students may prefer more individual active learning to learn difficult class materials instead of groupwork or peer learning. Students in upper-level accounting courses may desire to have more flexibility and control to manage their time.

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X-treme Makeover . . . Over and Over Again

Cory Angert, University of Houston-Downtown, Texas, United States

ABSTRACT

When Microsoft Corporation, in 2013, announced several controversial restrictions for its Xbox One videogame entertainment console, the company ignited a maelstrom of backlash that placed the firm in a precarious position. Responding to the tumult, the company hurriedly reversed all of its intended plans. The *BEIJ* article "X-treme Makeover: A Case Study of Microsoft's Dramatic Xbox 180 Strategy Reversal" (Angert, 2019) details the events of this industry-shaking strategic pivot. One might assume that the company had learned its lesson, yet nearly eight years later in 2021, Microsoft again announced extremely unpopular policies, only to be forced to immediately retract them. The present research updates the previous *BEIJ* article and includes new topics for discourse. This supplemental piece presents a brief recap of the 2013 events documented in the previous case study, a succinct account of the more-recent 2021 situation, and discussion questions intended to assist professors in facilitating student learning.

Keywords: strategic pivot, Microsoft, Xbox Live, Netflix

INTRODUCTION

The 2019 *Business Education Innovation Journal* article "X-treme Makeover: A Case Study of Microsoft's Dramatic Xbox 180 Strategy Reversal" (Angert, 2019) highlighted how, in 2013, American technology company Microsoft Corporation (NASDAQ: MSFT) made a series of unpopular decisions that quickly triggered the company's executing a dramatic strategic pivot shortly before launching its Xbox One videogame entertainment console. In the years since, the firm has adopted a concerted customer-first focus for its videogame endeavors, with many of these more gamer-centric adjustments' eliciting favorable results. Despite this promising direction, it appears that Microsoft remains susceptible to making ill-advised decisions, as evidenced by an emblematically significant event that occurred in January 2021. This brief addendum to the 2019 case study seeks to build on and recontextualize the case by specifically scrutinizing the demarcation of when an organization's reversing its strategic moves evidences prudent judgment and when such a reversal demonstrates a lack of sound reasoning.

PREVIOUSLY ON DAYS OF OUR XBOX LIVE

The present article is intended as a companion piece to "X-treme Makeover: A Case Study of Microsoft's Dramatic Xbox 180 Strategy Reversal" (Angert, 2019) and is, thus, meant to be deployed in an educational setting only after students have read the previous paper; while this is the expected use case, in an effort to broaden this supplement's applicability, a concise summary of the preceding study is provided below in order to allow the present manuscript to function as a standalone strategic management exercise.

On May 21, 2013, Microsoft unveiled the Xbox One videogame entertainment system. With this new console, the company hoped to make strides not just to capture the traditional audience of videogame aficionados but also to broaden the console's market to appeal to consumers of all types of entertainment media. In the company's attempt to capture a wider market, much of the Xbox brand's core audience of gamers began to feel somewhat estranged from Microsoft's latest offering, wondering whether this new console would live up to the Xbox brand's legacy as a solid choice for those primarily interested in playing videogames on what had always been, first and foremost, gaming-oriented hardware (Hruska, 2013; Plunkett, 2013). Despite this concern shared by many in the gaming community, interest remained high; however, soon came revelations that utterly alienated many potential customers.

Shortly after the Xbox One was unveiled to the world, Microsoft confirmed rumors that had been circulating about several unpopular restrictions designed to limit consumers' ability to freely play, share, trade, resell, and rent Xbox One videogames. Among other issues, game discs would be tied to a player's home console and online profile, thus preventing others from using the same disc on their Xbox consoles; in order to function, the Xbox One would have to connect to the internet at least once every twenty-four hours; and the system would not work without a special camera and microphone array called Kinect plugged in at all times, a mandate that raised privacy concerns. Sony's PlayStation 4, the Xbox One's primary competitor, did not impose any such restrictions and, thereby, was met with

a comparatively much warmer reception. Outraged gamers protested Microsoft's intended policies, but the company held firm to the announced plans.

After weeks of online backlash and bad press – as well as a reportedly substantially lower number of preorders for the Xbox One console than for Sony's PS4 (Strategy Analytics, 2013) – Microsoft finally relented and retracted essentially all of the previously-announced unpopular practices. Microsoft executives communicated these changes in a June 19, 2013 press release entitled "Your Feedback Matters – Update on Xbox One" (Microsoft, 2013). In the following days leading up to the Xbox One's November 2013 launch, Microsoft continued to revise its initial strategy, making adjustments to the assortment of hardware peripherals included with each Xbox One console, the manner by which game developers could publish their Xbox software, and several other aspects of the previously-established strategy.

THINKING OUTSIDE THE XBOX

Microsoft's radical about-face and continued revisions suggested perhaps a certain degree of ineptitude, but these actions may provoke myriad alternative interpretations. While some might view the sudden change of direction as a capitulation in the face of consumer fury, others might see the same decisions as a receptiveness to stakeholder feedback. This dichotomy strikes at the heart of the present article's central question – When is a company's reversing its deliberate strategy appropriate, and can such reversals sometimes go too far? Whereas an organization's scrapping of its plans could be seen as a weakness, since the move seems to indicate a tacit admission that mistakes were made, the very same decision could also be classified as a sign of strength when viewed through a different lens. One might argue that a firm willing to modify its strategy can be interpreted as a prime example of a nimble, adaptive entity, an open-minded actor willing to make changes whenever the need arises.

Often, the difference in how such strategic pivots are perceived hinges largely on the manner by which the alterations are communicated to the public; failures can be spun into successes or triumphs can become defeats, with the outcome's often being determined, at least in part, by the efficacy of a company's public relations efforts. The market may not respond favorably to a firm's begrudgingly acquiescing to angry customers' demands, but it might applaud an organization that values its patrons to such an extent that the company is willing to take drastic measures to better serve its customers. Both scenarios could entail identical actions; but, based on how each is communicated, the first would likely evoke negative stakeholder reactions and poor outcomes for the firm while the latter approach could actually improve the company's image and produce positive outcomes by virtue of creating an impression that the organization listens to and truly cares about its clientele.

LIVE QWIK, DIE YOUNG

Microsoft is not alone in asserting significant pronouncements only to walk back said declarations shortly thereafter. For example, subscription video provider Netflix, Inc. (NASDAQ: NFLX) helped pioneer premium streaming video; and, by capturing a large share of the online programming market before competitors even had a chance to catch up, has maintained a sizeable lead in this medium ever since. As of this writing, Netflix holds a market share of approximately 28 percent (Duprey, 2021). In September 2011, however, Netflix stood on far less stable ground. For the preceding decade, Netflix had made a name for itself as a subscription-based DVDs-by-mail rental business. The company's executives, however, saw Netflix's future as an internet-based video streaming service. As a result, in 2007, the firm began offering its subscribers the ability to immediately watch select movies via the World Wide Web, rather than having to order rental copies and then await postal delivery. By 2011, this capability had become so popular that Netflix executives, more confident than ever that online viewing represented the organization's greatest area for growth potential, shifted their primary focus to streaming. In order to capitalize on the opportunity, the strategic decision makers felt that splitting up the DVDs-by-mail and streaming businesses would prove essential, as each required unique structural and operating approaches. Additionally, whereas sending discs through the mail appeared to be a business model with a fast-approaching expiration date, serving up media content via the internet was a potentially highly lucrative concept that Netflix was eager to help pioneer. Netflix began to disentangle its two distinct types of offerings, charging separate subscription fees for its DVD rental plan and for its burgeoning streaming service. The move was met with confusion and hostility from Netflix customers – especially since the combined price of both subscriptions would essentially raise a person's monthly bill by 60 percent – and resulted in the firm's investors' perhaps predictably losing confidence (Sandoval, 2012). In an effort to mitigate the damage, Netflix CEO Reed Hastings issued a public apology for the company's lack of clarity and announced the launch of a new service called Qwikster. The idea behind Qwikster was to completely spin off the DVD division of

Netflix into its own entity in order to render Netflix proper an enterprise concerned purely with video streaming. (The rebranding and restructuring of the DVD rental division into the newly-formed Qwikster would also bring with it the added benefit of an option for Qwikster subscribers to rent videogame discs.) Subscribers loathed the concept of Qwikster, seeing it as an added burden and an instance of Netflix's taking a bad situation and making it even worse. Now, patrons who wished to both rent discs by mail and stream video online would be required to juggle two accounts, on two separate web sites, while sharing their credit card details with two different companies that would each bill the individual for services rendered. The hassle that these redundancies were poised to create produced so great a backlash that the company experienced the beginning of a mass customer exodus (Chappelle, 2011). Less than a month after Netflix had announced Qwikster, the firm scuttled all of the projected spinoff plans.

The "qwik" demise of Qwikster came as a relief to many, and Netflix was able to slowly begin rebuilding consumer confidence. In the subsequent years, Netflix experienced exponential growth and became a behemoth within the entertainment industry. Still, to those who had experienced the brief ordeal, the specter of Qwikster remains. One reporter caustically expressed upon the announcement that Qwikster was no more that "Qwikster was a dumb idea. Dumb, dumb, dumb. It should certainly be a first ballot entrant into the Bad Decision Hall of Fame, enshrined next to New Coke, Prohibition and that time Garth Brooks dyed his hair black and played rock music under the name Chris Gaines. Better choices have been made at 24/7 Las Vegas chapels after too many Limoncello shots" (Gilbert, 2017). While conventional wisdom seemingly regards the Qwikster saga as an unforced questionable error, a terribly misguided mistake that nearly brought down an entire company that had, until that point, been on the precipice of prodigious success, it is worth contemplating events such as the Qwikster (and Microsoft) debacle in order to ascertain whether said strategic moves are always truly as disastrous as they might at first appear.

Could the introduction of, and almost immediate destruction of, Qwikster have actually been a savvy tactic of shifting attention away from Netflix's unpopular decision to unbundle its two distinct services and away from the resultant price hike? The bad publicity cost Netflix some subscribers, but might those cancellations have been worth the good press that the company earned by demonstrating that Netflix listens to its clientele and values what its patrons have to say enough to effect major strategic change based on customer feedback? Qwikster appears to have been an ill-fated and inadvisable venture, but Netflix has thrived in the years since. Perhaps the company would have performed even better had it gone forward with its Qwikster plan. Or, maybe Netflix would not have performed as well as it has if not for the Qwikster incident. If the whole Qwikster episode was not some sort of orchestrated ploy, is it possible that Netflix actually benefitted from the controversy and subsequent course correction? When do messes of a firm's own making help, and when do they hurt? Keep these ideas in mind as you read about Microsoft's rapid reversal.

LIVE FOR A DAY

While Microsoft, Netflix, and other companies have acted swiftly to do away with certain strategies shortly after their public introductions, at the beginning of 2021, Microsoft set what might very well be a new world record for speedy retractions. An already-established stipulation requires that users who wish to play online multiplayer games on Xbox consoles must pay for a service called Xbox Live Gold. In addition to enabling gameplay with other people via the internet, Xbox Live Gold provides subscribers with supplemental benefits such as the ability to claim select free games each month and access to exclusive offers and discounts. Pricing and availability vary by region; but, in the United States, the retail price, as of January 1, 2021, for one month of XBL Gold was $9.99, three months was $24.99, six months was $39.99, and a full year was $59.99.

On the morning of January 22, 2021 – specifically, at 6:00am Pacific Time – Microsoft announced in a blog post that the price of Xbox Live Gold would soon significantly increase (Xbox Live Gold Team, 2021). One month would now cost $10.99, three months would be priced at $29.99, six months climbed to $59.99, and the annual subscription option was being phased out. In essence, the price of one year of Xbox Live Gold had suddenly doubled (i.e. two six-month subscriptions' totaling $120 versus one yearlong subscription for $60). Gamers were predictably infuriated with the unwelcome news; and, as many gaming aficionados are particularly wont to do, voiced their displeasure on social media. Much of the goodwill that Microsoft had slowly earned back over the seven years since the troubled launch of the Xbox One was, in the span of mere hours, quickly eroding. After half a day's worth of consternation and complaints, Microsoft realized that the company had a fiasco of its own making with which to deal, and so, in order to quash the discontent, composed a statement regarding the controversy.

At 8:52pm PT that night, slightly less than fifteen hours after the initial pronouncement, Microsoft amended its original posting to read "No Changes to Xbox Live Gold Pricing." Not only did the company completely reverse course on its plans, entirely negating everything that it had merely hours before put forth, but the software giant also added that an Xbox Live Gold subscription would no longer be needed for a gamer to take advantage of the online component of free-to-play games (titles that cost no money to download and play but that are often supported by microtransactions, a term used to describe small optional payments for items and features designed to enhance a player's experience). The fact that free-to-play games would no longer require an additional subscription fee, especially because rival Sony was already providing such an exception to its online subscription model, did not come as a surprise; however, the timing of this announcement is of note, as it certainly emphasized the fact that Microsoft was trying its best to extend to its user base a wholehearted mea culpa. (Microsoft made good on its promise of removing the Xbox Live Gold requirement for free-to-play games three months later on April 21, 2021 (Warren, 2021).) Similar to the Xbox One catastrophe that the company had spent years trying to live down, Microsoft was once again caught in a moment of crisis, compelled to undo all that it had just done – in this case, so quick a reversal as to induce metaphorical whiplash.

This stunning about-face brought with it a rather repentant written apology, which read in part "We messed up today and you were right to let us know. Connecting and playing with friends is a vital part of gaming and we failed to meet the expectations of players who count on it every day. As a result, we have decided not to change Xbox Live Gold pricing" (Xbox Live Gold Team, 2021). Although Microsoft ultimately did right by its customers, the question remains as to what effect this and other such events might have on stakeholders. At this point, Microsoft has established something of a pattern for publicly declaring plans only to then, a short time later, retract these intentions. Negating a pronouncement a mere fifteen hours after it is first publicized serves as a particularly extreme example of backpedaling, but perhaps this instance proves acutely indicative of a larger issue. It is worth examining, in light of Microsoft's rapid reversal, whether such reactivity can inflict damage on a company, especially when such behavior is repeated on multiple occasions.

CONCLUSION: A GOLD-EN OPPORTUNITY FOR DISCUSSION

Does Microsoft's recurring alteration of its deliberate plans make the company appear indecisive? Could this perception of indecision shake stakeholders' confidence in the organization? Conversely, perhaps consumers and other stakeholders view Microsoft's policy reversals in a positive light, because they see the resolutions as shining examples of a company's heeding customer feedback and making attempts to better accommodate buyers' preferences. If this is the case, however, is it not troubling that Microsoft executives contemplated – and then went so far as to actually act upon – poorly-conceived ideas? Does the perceived ineptitude point to a fundamental flaw in the firm's internal processes? In the case of Netflix, for example, executives diagnosed that the Qwikster initiative (aka debacle) resulted from a failing in the company's culture, and Netflix's strategic leaders almost immediately took measures to address this shortcoming, establishing a new internal safeguard dubbed "'farming for dissent,' where on these big decisions everybody has to write down in public in a shared document, how they feel about the idea and their judgment about it" (Konnikova, 2020). By taking steps to minimize the possibility of misguided schemes' ever again being rolled out and then necessitating cleanup after-the-fact, Netflix has largely avoided further blunders on the scale of Qwikster. Unfortunately, as this companion article demonstrates, Microsoft, in contrast, seemingly continues to demonstrate a certain lack of forethought.

Thus, a suggested follow-up to the 2019 *Business Education Innovation Journal* article "X-treme Makeover: A Case Study of Microsoft's Dramatic Xbox 180 Strategy Reversal" would be for strategic managers and students of business administration to engage in discussion concerning the point at which a company's reversing of its deliberate strategy might go too far by virtue of making the firm appear weak, rudderless, or otherwise unfavorable to key stakeholders. Companies need the support of key stakeholders such as customers and shareholders in order to survive, so firms must be cautious when taking actions that might shake these groups' confidence and potentially cause these former advocates to question the organization's competence and reliability. For this reason, one could conceivably argue that Microsoft's penchant for strategy reversals might one day become too risky for investors to bear and too irritating for consumers to support. Even though, each time, Microsoft thought better of implementing its unpopular announced policies, the fact remains that each of the initial, now-rescinded assertions provided a glimpse into how the company wanted to move forward. Only in reaction to pressure exerted by outside actors was the company forced to rethink its strategies. This forced adaptation implies that for every idea that was walked back, as a result of unmitigated derision, there exists a possibility of the concept's being introduced at a later date, perhaps in a slightly more palatable form. Therefore, stakeholders – especially customers – are entitled to their skepticism

and, given enough occurrences similar to the tumult herein recounted, might begin to shun organizations that seemingly do not learn from their own history.

A recommended lesson plan for application of this case study in a class setting is to first assign students the readings and exercises suggested in "X-treme Makeover: A Case Study of Microsoft's Dramatic Xbox 180 Strategy Reversal" (Angert, 2019). Upon completion of study based on that article's lesson plans, students should then read the "Thinking Outside The Xbox," "Live Qwik, Die Young," and "Live for a Day" sections of this article. (The section entitled "Previously on Days of Our Xbox Live" can serve as an optional reading to be assigned if either the professor has not presented the initial case or time has passed since the initial case had been examined and students are in need of a refresher.) While the most relevant information from the Xbox Live Gold Team (2021) "No Changes to Xbox Live Gold Pricing, Free-to-Play Games to be Unlocked" press release is presented within the case, instructors may wish to designate the actual press release as required reading. To provide students with a deeper understanding of the Xbox Live service, instructors may also elect to assign "What are Xbox Live and Xbox Live Gold?" (Batt, 2020). Since company reputation and legitimacy prove pivotal concepts examined in this paper, prior to class, instructors could also assign readings on both of these salient topics. Instructors – especially those already familiar with the videogame industry – may also wish to refer students to a reaction editorial written by IGN's Ryan McCaffrey (2021) entitled "Opinion: Microsoft's Xbox Live Gold Price Hike Isn't a Good Look" as a means by which to springboard into a broader discussion of company reputation.

Once students have familiarized themselves with the case and have completed all assigned readings, professors can engage students through discussion in a class-wide, small-group, or paired format. Alternatively, students could be assigned open-ended written prompts. Some questions that could be posed include:

1. How important is a company's reputation? In what ways does the importance of reputation vary based on industry and/or other such factors?
2. How can social media affect a company's reputation? How has social media forced companies to rethink their approaches to preserving their reputations?
3. What types of actions might potentially help to improve a company's reputation, and what types of actions might potentially hurt a company's reputation?
4. When a company deems it necessary to make a move that it knows will likely be viewed unfavorably and could potentially damage its reputation, what strategy should the firm employ when enacting the unpopular move?
5. In what ways might customer perceptions of a firm be affected by positive or negative changes to its competitors' reputations? For instance, if Sony makes a decision regarding the PlayStation that damages its reputation, would customers' perceptions of Microsoft and the Xbox brand automatically improve? Why or why not?

Optional: Professors may wish, based on their comfort level and students' familiarity with the subject matter, to delve deeper into more advanced topics. For instance, students could be asked to speculate as to the possible reasons that Microsoft might have had for changing the pricing of Xbox Live Gold. For example, could the price hike have been intended as a ploy to compel Xbox Live Gold subscribers to upgrade to the more expensive Xbox Game Pass Ultimate? (Details about Xbox Game Pass Ultimate available at https://www.microsoft.com/en-us/store/b/compare-xbox-game-pass-plans.)

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Teaching the Sampling Distribution of the Average

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ABSTRACT

The most difficult topic for students to understand in elementary statistics is the sampling distribution of the sample average $\bar{X}$ and along with it the quantity $\sigma/\sqrt{n}$ which is the standard deviation or standard error of $\bar{X}$. Both appear in confidence intervals and test statistics, but with $\sigma/\sqrt{n}$ being the mystery formula of elementary statistics. It is usually still a mystery even after it has been covered in class because it is such a tricky topic. Every time a student sees $\sigma/\sqrt{n}$ in beginning statistics, they are probably thinking "I don't understand". The behavior of $\bar{X}$ is difficult because $\bar{X}$ is a random variable and it is hard at an elementary level to imagine and/or understand why $\bar{X}$ is random. In a class example, $\bar{X}$ is just a number sitting on a page not moving or changing and not looking at all random. At an elementary level it is often hard to picture the randomness in the data collecting mechanism that got you that $\bar{X}$. The mystery formula $\sigma/\sqrt{n}$ measures the amount of variability and randomness in $\bar{X}$. To understand this formula completely, one must go into the full mathematics used to derive it. In elementary statistics one rarely has time to do and cover the full mathematics even if the students were interested in knowing about it, which they are probably not. In our opinion, the coverage of this topic in most beginning statistics textbooks is unreadable and totally not understandable to a beginning statistics student. It is just as understandable as if it were written in Chinese characters. Yet this is a most important topic since $\bar{X}$ is ubiquitous in statistics.

We present some ideas for explaining the sampling distribution of $\bar{X}$ and explaining why $\sigma/\sqrt{n}$ is correct and true, based averaging rolls of multiple four-sided dice. You can watch the randomness in dice when you roll them live in class and average them live in class. This helps to visualize that $\bar{X}$ is a random quantity. With dice you can write down everything that can happen and then use these possibilities to find the sampling distribution simply by counting. In simple examples you can look at the possible outcomes and see what is going on behind the formulas, no fancy mathematics like calculus is required. The average behaves in ways that one would never guess, until you learn about it in a statistics class. It is our opinion that even it if you know the calculus based proof of $\sigma/\sqrt{n}$, you will still find the elementary approach of this paper to be interesting. The general proof of $\sigma/\sqrt{n}$ is a technical proof that does not really give any intuition as to what is going on. This paper provides a lot of that intuition.

Keywords: the sampling distribution of the sample average, the standard deviation or standard error of the average.

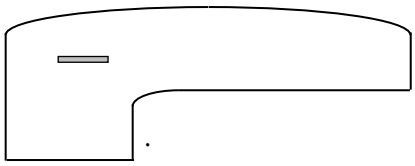
INTRODUCTION

Sigma over root n, $\sigma/\sqrt{n}$, the standard deviation or standard error of $\bar{X}$, is the Holy Grail of elementary statistics. The expression is relevant whenever $\bar{X}$ is used, such as when $\bar{X}$ appears in the formula for the intercept in regression, that in addition to its use in confidence intervals and hypothesis testing. The formula $\sigma/\sqrt{n}$ comes from the sampling distribution of $\bar{X}$, which is the most difficult topic to understand in elementary statistics. The topic is difficult for introductory students to grasp because $\bar{X}$ is a random quantity. To completely understand the sampling distribution you must go all the way into the mathematics of random variables. In elementary statistics one rarely has the time for this, even if the instructor had the desire to do so. The behavior of the average is described by the probability distribution of $\bar{X}$. For example, if $f(\bar{x})$ is the probability density of the average of two measurements then the formula for $f(\bar{x})$ is given by $f(\bar{x}) = \int g(2\bar{x} - y)g(y)dy$, where $g(x)$ is the probability density that generates the data and also determines σ. However, writing down this integral formula, called a convolution, in an elementary statistics class is not going to produce any positive outcomes. Other similar techniques produce the formula: $Var(X_1 + X_2) = Var(X_1) + Var(X_2)$ for independent random variables, which is then used to prove $\sigma/\sqrt{2}$ as the standard error of $\bar{X}$ when there are two measurements. This variance relationship is another thing that is vague and tricky to do in an elementary course. These ideas of course generalize to n data points. These all are technical proofs that do not really give any intuition as to what is going on. In an elementary class even once $\sigma/\sqrt{n}$ is introduced, students will usually spend the rest of the semester wondering what it is about and where it came

from. To improve this situation we present ways to teach this topic that provide intuition into what is going on and why $\sigma/\sqrt{n}$ should be true. We show that this happens and can be explained by the way independent measurements combine. The quantity $\sigma/\sqrt{n}$ tells us that the average is less random that the numbers that go into it, and we shall explain exactly what this means.

In this paper we present sampling distributions in a simple way using rolls of four-sided dice. This only requires arithmetic to see what is going on, no calculus required. With simplified measuring devices such as dice, you can be very specific about what happens with $\bar{X}$ by writing everything down. After writing down everything, you can simply look at what is going on. After discussing simple devices, we will explain why our simple measuring device is not as far from a real measuring device as one might think. We think this approach will make students less bewildered when $\sigma/\sqrt{n}$ is used in confidence intervals, hypothesis tests and other places later on in statistics.

Before getting to simple measuring devices, let's start with a hypothetical situation. Suppose the Assistant Production Manager of a small manufacturing company goes to work one day only to find that that they have been given a promotion to Production Manager. Along with the promotion they have been given a new desk with a shape as below:



Excited by the promotion the new Production Manager is interested in finding out how big the new desk is, in particular how long the desk is at its longest point. The manager finds a 12-inch ruler and proceeds to measure the desk. Because of the shape of the desk, it will not be so easy to measure its length with such a small ruler. Suppose the desk is measured four times with the following results: 10' 2" (10 feet 2 inches), 9' 9", 9' 11", and 10' 4" for the length of the desk. Not so surprisingly the measurements are not the same due to the randomness in the measuring process. The randomness comes from the difficulty of precisely picking up and laying down the ruler in the right place time after time after time.

Question: Which of the following five numbers do you think is closest to the true length of the new desk?
A) $10' 2''$
B) $9' 9''$
C) $9' 11''$
D) $10' 4''$
E) $\frac{10'2''+9'9''+9'11''+10'4''}{4} = 10'\frac{1}{2}''$.

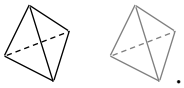
Most people would probably answer E). Somehow our intuition says that individual measurements can be off, but the collective information in all of the measurements should enable one to get closer to the value of the true desk length by taking the average. Statistics says this intuition turns out to be correct. In exactly what sense that one's intuition is correct is given by the sampling distribution of the sample average, summarized by and with the quantity $\sigma/\sqrt{n}$, where σ is a measure of the amount of randomness in each individual measurement. The quantity $\sigma/\sqrt{n}$ tells us that $\bar{X}$ is less random than the numbers that go into it, which we will explain. The new manager eventually opens a drawer in the new desk that happens to have a paper with the desk's specifications on it. The actual length is $10'$ so here the average E) was closer to the true length than any of the individual measurements.

SECTION 1: A SIMPLIFIED MEASURING DEVICE

We introduce a different simpler measuring device than a ruler for measuring the desk length of the desk in the Introduction. Real data situations have all kinds of randomness in them, just as measuring desk length does. Randomness means that probability is going to be involved. Real measuring devices are complicated and require calculus to understand them completely, so we take a simplified measuring device to use to measure the length of the desk. This simple device will require only arithmetic to understand it. To construct such a device take a four-sided die, a tetrahedron, and place the following numbers on each side: 7 feet, 9 feet, 11 feet, and 13 feet. It is

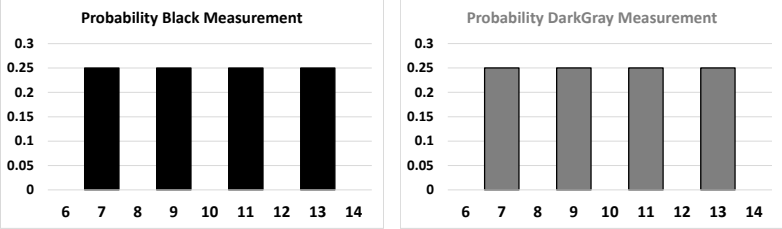
obviously not a very accurate measuring device for the desk, but we will see that it behaves in a way similar to that of a real measuring device. Multiple measurements of the desk will be taken with this four valued apparatus. Since there is randomness in rolling dice our device has randomness just like real measuring devices do. [Note this dice measuring device never gives a reading that is the correct length of the desk, but on average gives the correct answer of 10 feet for the true length of the desk. Here we say that the measuring device is unbiased. Unbiased means that on average the measuring device gives the correct value even though many or all of the numbers produced by the measuring device are off from the true length value.]

We start by measuring the desk twice with two tetrahedrons and then averaging the two measurements. To make it easier to see what is going on we take the first measurement from a fair Black tetrahedron and the second measurement from a fair DarkGray tetrahedron both with readings 7, 9, 11, and 13:



[We admit these are some strange looking rulers.] What can happen with each of the measurements in given in Figure 1. Each of the four numbers is equally likely on both the Black die and DarkGray die.

Figure 1: Probability Histograms for the Black and DarkGray Measuring Devices



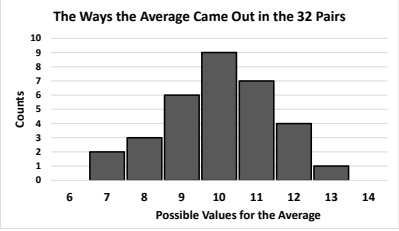
A first part of learning how the average behaves is to do an experiment in class and run a simulation. Suppose the pair of dice is rolled 32 times and in each of the 32 pairs the average of the two numbers that turn up is computed. Before the simulation starts the class can be asked how they think the simulation will turn out. For someone who has never had statistics before, the first guess is probably that the average will equally likely be 7, 9, 11, or 13. Before the simulation starts one can also ask what is likely to happen on the Black die and what is likely to happen on the DarkGray die. Obviously you would expect the number 7 to turn up about 32/4 = 8 times on the Black die. Obviously it would be about 8 times each for 9, 11, 13, 7, 9, 11, and 13. The naïve guess about the behavior of the average means that the numbers 7, 9, 11, and 13 would each turn up about 8 times each for the average. After this discussion the simulation is conducted. [In our class we wrote an Excel Macro that does the simulation.] Table 1 has the possible results of a simulation, 32 rolls of the pair of tetrahedrons.

Table 1: The results of 32 rolls of a pair of four-sided (modified) dice

Experiment #	BlackDieResult X_B	DarkGrayDieResult X_{DG}	Average = (Black+DarkGray)/2 $\bar{X} = (X_B + X_{DG})/2$
1	**7**	**9**	**8**
2	**9**	**13**	**11**
3	**9**	**11**	**10**
4	**11**	**13**	**12**
5	**7**	**7**	**7**
6	**7**	**13**	**10**
7	**13**	**11**	**12**
8	**11**	**11**	**11**
9	**11**	**7**	**9**
10	**7**	**11**	**9**
11	**13**	**11**	**12**
12	**11**	**9**	**10**
13	**13**	**13**	**13**
14	**13**	**7**	**10**
15	**9**	**9**	**9**
16	**11**	**9**	**10**
17	**7**	**11**	**9**
18	**11**	**11**	**11**
19	**13**	**11**	**12**
20	**9**	**7**	**8**
21	**7**	**7**	**7**
22	**9**	**9**	**9**
23	**9**	**13**	**11**
24	**9**	**11**	**10**
25	**11**	**9**	**10**
26	**13**	**7**	**10**
27	**7**	**9**	**8**
28	**13**	**9**	**11**
29	**9**	**13**	**11**
30	**11**	**7**	**9**
31	**9**	**13**	**11**
32	**13**	**7**	**10.**

When you look at the Average $(\bar{X})$ fourth column in Table 1 you get the first indication that something is different about the average. The average can be an even number even though only odd numbers from the individual measurements go into $\bar{X}$. A second indication that the average is different than the numbers that go into it is that the number 7 turns up in the average only twice in the 32 simulations as opposed to the eight times one would expect if the average behaved in the same way (straight across) as the numbers that go into the average. Figure 2 has a histogram of the counts for the number of times each number came up for the average in the simulation.

Figure 2: A Histogram for the Results of the Simulation



In Figure 2, $\bar{X}$ came out more like a triangle and not straight across as the naive guess would indicate. Is this a real phenomenon or did something strange happen in the simulation? Maybe something unusual happened just because of the randomness in the simulation. To see if something extraordinary happened we can first look at what happened with the Black die by itself and with the DarkGray die by itself. In Table 1, in the 32 pairs, the Black numbers 7, 9, 11, and 13 came up respectively seven, nine, eight, and eight times. The DarkGray numbers 7, 9, 11, and 13 came up respectively eight, eight, nine, and seven times. Given the randomness in the simulation the Black and DarkGray measurements did behave according to Figure 1, basically straight across for the Black die and DarkGray die. The individual measurements behaved as expected but the average did not behave according to the naïve guess. So does $\bar{X}$ really behave according to a triangle or was this just a fluke of this simulation? After the simulation, it is time to explain that the sample average in this situation does behave according to a triangle. Now it is spelled out how and why this happens.

Let's systematically study what can and might happen in this experiment using probability. The Black measurement, call it X_B (as was done in Table 1) comes out randomly as 7, 9, 11, or 13. Since there is randomness, this means probability is involved with the Black measurement. The DarkGray measurement, called X_{DG}, comes out randomly as 7, 9, 11, or 13. This means probability is also involved with the DarkGray measurement. Randomness in the individual measurements implies randomness in the average $\bar{X} = (X_B + X_{DG})/2$. The consequence is that probability is then also involved with the sample average. In this, pretty simple, example we can calculate the probabilities for how $\bar{X}$ can turn out. Note that because the result on the first die does not affect the result on the second die (we say they are independent), then any Black measurement can go with any DarkGray measurement. There are $4 \times 4 = 16$ possible ways two rolled tetrahedrons can turn out all of which are equally likely. The 16 possibilities and the average are written down in Table 2.

Table 2: The Possible Outcomes for the Combination of the Two Independent Four-Sided Dice

		DarkGray Measurement			
Possible DataPairs		7	9	11	13
Black Measurement	7	7,7	7,9	7,11	7,13
	9	9,7	9,9	9,11	9,13
	11	11,7	11,9	11,11	11,13
	13	13,7	13,9	13,11	13,13.

		2nd Measurement			
Possible $\bar{X}$'s		7	9	11	13
1st Measurement	7	7	8	9	10
	9	8	9	10	11
	11	9	10	11	12
	13	10	11	12	13.

The Black 7 occurs in 4 out of the 16 possibilities (top row left table) so that $P(Black = 7) = 4/16 = 1/4$, and the same is true for all the other Black and DarkGray numbers. The Black and DarkGray measurements each behave according to the probabilities in Figure 1. What do we think about the combination of the measurements? For example, in the table, if the measurements of the desk turned up Black = 7 and DarkGray = 9 then we would have: $\bar{X} = (7 + 9)/2 = 8$ and we would think and suggest that the desk is 8 feet long. The right table of Table 2 tells us how the average, $\bar{X}$, behaves.

The average $\bar{X}$ is a random number because it depends on which random numbers turn up when the dice are rolled. Each of the 16 combinations of the Black and DarkGray are equally likely, so the probability that $\bar{X}$ takes on each particular value that it can take on is calculated from the above to be:

(1) $P(\bar{X} = 7) = 1/16, \quad P(\bar{X} = 8) = 2/16, \quad P(\bar{X} = 9) = 3/16,$
$P(\bar{X} = 10) = 4/16, P(\bar{X} = 11) = 3/16, P(\bar{X} = 12) = 2/16,$
$P(\bar{X} = 13) = 1/16.$

This set of probabilities is called the Sampling Distribution of $\bar{X}$ when $n = 2$.

This sampling distribution means that if we are about to roll this pair of four-sided dice and then average the numbers that turn up, there is 6.25% chance that the average will be a 7 [6.25% = (1/16) x 100%], a 13.5% chance that the average is a 8, a 18.75% chance the average is a 9, a 25% chance the average is a 10, and so on. A graph of the sampling distribution of $\bar{X}$ is in Figure 3.

Figure 3: Probability Histogram of the Sampling Distribution of $\bar{X}$ for $n = 2$ Measurements

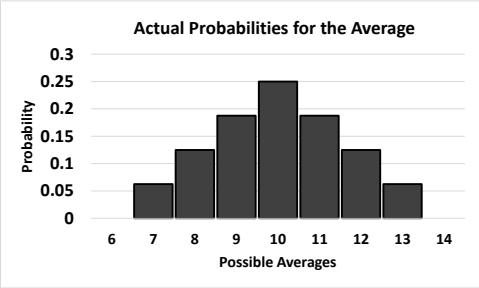


Figure 3 shows that for $\bar{X}$ in this situation the probabilities do in fact behave according to a triangle and that the results in the simulations in Table 1 were consistent with these probabilities and not an unusual result.

The word "distribution" is a confusing word in elementary statistics, more confusing than it needs to be. Let's be clear about what a distribution is. A distribution is a collection of probabilities that tells you how something behaves. The Distribution of $\bar{X}$ tells you how $\bar{X}$ behaves. The distribution tells you where $\bar{X}$ tends to be and the distribution tells you everything that can happen with $\bar{X}$. The above distribution tells you that the average of the two dice behaves according to triangular shaped probabilities. Here are the some of the things that you want to know from the Distribution of $\bar{X}$:

1) What are the possible $\bar{X}$ values? At what $\bar{X}$ values is the majority of the probability?
   What $\bar{X}$ values have a medium probability? What $\bar{X}$ values have little or no probability?
2) Do the possible $\bar{X}$ values tend to be spread out or tend to be close together?
3) Do the possible $\bar{X}$ values tend to be close to the true value you are trying to measure?
   Is there a high probability that $\bar{X}$ is close to the true value you are trying to measure?
4) Often you want to compare two distributions, especially with different sample sizes, to compare the probabilities.

Equation (1) tells us in this situation that the possible $\bar{X}$ are the integers between 7 and 13 with the majority of the probability at 9, 10, and 11. The possible $\bar{X}$ tend to be quite spread out with a 12/16 probability of getting an $\bar{X}$ more than 1 foot off from the true desk length of 10 feet. With two measurements this distribution does not yet give one as high a probability of being close to the true value as one would like.

We could have previously also used the word "distribution" to describe the probabilities of the Black measurements and the probabilities of the DarkGray measurements, but decided to save this word for first use on the average. Again let X_B be the value of the Black measurement that turns up and X_{DG} be the value of the DarkGray measurement that turns up, then these distributions for the individual measurements are:

$$(2)\quad \begin{matrix} P(X_B = 7) = 1/4, \\ P(X_B = 9) = 1/4, \\ P(X_B = 11) = 1/4, \\ P(X_B = 13) = 1/4. \end{matrix}$$

This collection of probabilities is the distribution of the Black measurement. This is how the Black Measurement behaves.

$$\begin{matrix} P(X_{DG} = 7) = 1/4, \\ P(X_{DG} = 9) = 1/4, \\ P(X_{DG} = 11) = 1/4, \\ P(X_{DG} = 13) = 1/4. \end{matrix}$$

This collection of probabilities is the distribution of the DarkGray measurement. This is how the DarkGray Measurement behaves.

The symbols X_B and X_{DG} (and also $\bar{X}$) are called random variables. A random variable is first a variable, a variable is something that takes on more than one value, second the variable is random specifying or meaning that each possible value has a certain probability of turning up. In this case the random variables X_B and X_{DG} are also said to have the same distribution. The same distribution means that two variables take on exactly the same values and each value that can be taken on has the same probability in both variables. Equation (2) shows that X_B and X_{DG} have the same distribution. It is important to note that having the same distribution does not mean that $X_B = X_{DG}$ always. Table 2 shows any Black measurement can go with any DarkGray measurement and in fact $P(X_B = X_{DG}) = 4/16$ (which is the upper left to lower right diagonal in the table) and in fact $P(X_B \neq X_{DG}) = 12/16$. With the distribution for X_B and X_{DG} as in Equation (2), the random variable $\bar{X}$ would be said to have a triangular distribution with values and probabilities given in Equation (1).

Now that the Distribution of $\bar{X}$ for two measurements has been documented it is time to look at what is going on behind the scenes. From Equation (1) $P(\bar{X} = 10) = 4/16$ but from Equation (2) $P(X_B = 10) = 0$ and $P(X_{DG} = 10) = 0$. The average places more probability closer to the center than the individual measurements. In this paper we will say that this means that $\bar{X}$ is less random than the numbers that go into it. Let's look at how and why this happens. Let's start by rewriting Table 2 in a particular way as in Table 3.

Table 3: Table 2 Redrawn, What happens When You Average

1st Measurement: Black Measurement	2nd Measurement: DarkGray Measurement 7	9	11	13
7	7	8	9	10
9	8	9	10	11
11	9	10	11	12
13	10	11	12	13.

This is how the combination of the two measurements behaves via $\bar{X}$.

From Table 3 you can simply see that there are more combinations where $\bar{X}$ is close to the center 10 (black ellipse) than there are combinations where $\bar{X}$ is far from 10 (gray ellipses). To get an idea of what is going on in Table 3, write 7 = 10 – 3 = TrueValue + Measurement Error of –3. Similarly write 9 = 10 – 1, 11 = 10 + 1, and 13 = 10 + 3 as TrueValues + Measurement Errors. Now take for example the number 10 in the lower left body of the table which is (13 + 7)/ 2 = [(10 + 3) + (10 + (–3))]/2 = 10. The measurement error in the number 7 is cancelled out exactly by the measurement error in the number 13 leaving $\bar{X}$ at the center 10, even though both measurements are way off 10. If we look at the 9 in the third row left part in the body of the table it is (11 + 7)/ 2 = [(10 + 1) + (10 + (–3))]/2 = 9, the measurement error in the 7 almost cancels out the measurement error in the 11 leaving $\bar{X}$ close to the center although not at the center. The 7 and 11 have a combined measurement error of $1 + (-3) = -2$ which is reduced further when divided by 2 for the average. If we look at the 8 in the second entry from the left of the first row body of the Table 3, it is (7 + 9)/ 2 = [(10 + (–3)) + (10 + (–1))]/2 = 8, both the 7 and the 9 have negative measurement errors that do not cancel out. Table 4 relates the possible averages to their measurement errors.

Table 4: The Possible Averages in Terms of Measurement Errors

Possible $\bar{X}$'s: Black Measurement	DarkGray Measurement 7	9	11	13
7	$\frac{(10-3)+(10-3)}{2} = 7$	$\frac{(10-3)+(10-1)}{2} = 8$	$\frac{(10-3)+(10+1)}{2} = 9$	$\frac{(10-3)+(10+3)}{2} = 10$
9	$\frac{(10-1)+(10-3)}{2} = 8$	$\frac{(10-1)+(10-1)}{2} = 9$	$\frac{(10-1)+(10+1)}{2} = 10$	$\frac{(10-1)+(10+3)}{2} = 11$
11	$\frac{(10+1)+(10-3)}{2} = 9$	$\frac{(10+1)+(10-1)}{2} = 10$	$\frac{(10+1)+(10+1)}{2} = 11$	$\frac{(10+1)+(10+3)}{2} = 12$
13	$\frac{(10+3)+(10-3)}{2} = 10$	$\frac{(10+3)+(10-1)}{2} = 11$	$\frac{(10+3)+(10+1)}{2} = 12$	$\frac{(10+3)+(10+3)}{2} = 13.$

When looking at Table 4, you can see that cancelation or close to cancelation of the measurement errors happens more often than non-cancelation. Before moving on, a few words to put this all together. Equation (2) tells us $P(Black = 7) = P(Black = 9) = P(Black = 11) = P(Black = 13) = 4/16 = 1/4$ and $P(DarkGray = 7) = P(DarkGray = 9) = P(DarkGray = 11) = P(DarkGray = 13) = 4/16 = 1/4$. This tells us that each measurement behaves according to the measuring device. However, Equation (1) and Table 4 shows us how the combination of the two measurements behaves with $P(\bar{X} = 7) = 1/16$, $P(\bar{X} = 8) = 2/16$ and so on. The combination does not behave at all like the numbers that go into it and tends to be closer to the center, closer to the true value you are trying to measure.

It is time to move on, the next step is to summarize the tables. The next thing to do at this time is to learn two numbers that summarize and encapsulate these probabilities and distributions. Now each measurement takes on only four numbers 7, 9, 11, or 13. Four numbers are not too much to deal with but even four numbers can be condensed. Most of the time in statistics, the exact distributions such as those in Equation (1) and Equation (2) are not explicitly used. Rather, summaries of the distributions are used. Useful summaries of the distributions are obtained by finding the center and spread of the possible X values produced by the measuring device and further by finding the center and spread of the possible $\bar{X}$'s obtained by combining the measurements. The center of the

measuring device X values, as measured by the average of the X values, and the spread of the X values, as measured by the population standard deviation of the X values, are given in Table 5.

Table 5: The Average (μ) and the Standard Deviation (σ) of the Measuring Device

Black Die			DarkGray Die		
X_B	$X-\mu_B$	$(X-\mu_B)^2$	X_{DG}	$X-\mu_{DG}$	$(X-\mu_{DG})^2$
7	−3	9	7	−3	9
9	−1	1	9	−1	1
11	1	1	11	1	1
13	3	9	13	3	9
$\mu_B = 10$		$SSX_B = 20$	$\mu_{DG} = 10$		$SSX_{DG} = 20$

$\sigma_B = \sqrt{\frac{SSX_B}{\#X_B}} = \sqrt{\frac{20}{4}} = \sqrt{5} \approx 2.236,$ $\sigma_{DG} = \sqrt{\frac{SSX_{DG}}{\#X_{DG}}} = \sqrt{\frac{20}{4}} = \sqrt{5} \approx 2.236.$

The center and spread are denoted respectively using the Greek letters μ and σ. The Black measurement and the $DarkGray$ measurement behave the same way (have the same distribution) so they have the same center $\mu_B = \mu_{DG}$ and the same spread $\sigma_B = \sigma_{DG}$. Therefore the subscripts can often be dropped with just μ and σ used. [There are many other symbols and expressions that represent these quantities such as, to name a few: for the center $\mu = \mu(X) = \mu_X = ExpectedValue(X) = E(X)$ and for the standard deviation $\sigma = SD(X) = \sigma_X$.] The quantity μ is the center of the measuring device. The quantity $\sigma = SD(X)$ measures how close a typical measurement X is to the center μ. These two numbers μ and σ can also be interpreted in the following way: "From measurement to measurement the measurements will probably not be the same (due to the randomness in the measuring process) but for this measuring device the measurements will tend to be around $\mu = 10$ but it is not unusual for a measurement X to be off by $\sigma = \sqrt{5}$ from 10 in a typical case."

The quantities μ and σ summarize each individual measurement, what about the average from the combination of the measurements? From its distribution, the average $\bar{X}$ tends to produce a number closer to the center compared to individual measurements. This implies that when the spread in the possible $\bar{X}$'s is calculated, it is going to be smaller than $SD(X) = \sqrt{5}$, the standard deviation of an individual measurement. Here the possible $\bar{X}$'s are $\bar{X}_1 = 7$, $\bar{X}_2 = 8$, $\bar{X}_3 = 8$, $\bar{X}_4 = 9$, $\bar{X}_5 = 9$, $\bar{X}_6 = 9$, $\bar{X}_7 = 10$, $\bar{X}_8 = 10$, $\bar{X}_9 = 10$, $\bar{X}_{10} = 10$, $\bar{X}_{11} = 11$, $\bar{X}_{12} = 11$, $\bar{X}_{13} = 11$, $\bar{X}_{14} = 12$, $\bar{X}_{15} = 12$, and $\bar{X}_{16} = 13$. The center for $\bar{X}$ is measured by calculating the average of the possible $\bar{X}$ as in Equation (3):

(3)

$$\bar{\bar{X}} = Average(\bar{X}) = \frac{\bar{X}_1 + \bar{X}_2 + \bar{X}_3 + \bar{X}_4 + \bar{X}_5 + \bar{X}_6 + \bar{X}_7 + \bar{X}_8 + \bar{X}_9 + \bar{X}_{10} + \bar{X}_{11} + \bar{X}_{12} + \bar{X}_{13} + \bar{X}_{14} + \bar{X}_{15} + \bar{X}_{16}}{16}$$

$$= \frac{7+8+8+9+9+9+10+10+10+10+11+11+11+12+12+13}{16} = 10.$$

This quantity $\bar{\bar{X}}$ is usually called the expected value of $\bar{X}$, denoted $Expected(\bar{X})$ or $E(\bar{X})$. [Also denoted $\mu(\bar{X})$ or $\mu_{\bar{X}}$.] Equation (3) is the definition of $E(\bar{X})$. That takes care of center, now for the spread. The spread of $\bar{X}$ is measured by the population standard deviation of the possible $\bar{X}$, denoted $SD(\bar{X})$ or $SE(\bar{X})$ (standard error of the sample average). The calculation is given in Table 6 as:

Table 6: The Standard Deviation of $\bar{X}$

X_B	X_{DG}	$\bar{X}$	$\bar{X}-\bar{\bar{X}}$	$\left(\bar{X}-\bar{\bar{X}}\right)^2$
7	7	$\bar{X}_1 = 7$	**–3**	**9**
7	9	$\bar{X}_2 = 8$	**–2**	**4**
9	7	$\bar{X}_3 = 8$	**–1**	**1**
7	11	$\bar{X}_4 = 9$	**0**	**0**
9	9	$\bar{X}_5 = 9$	**–2**	**4**
11	7	$\bar{X}_6 = 9$	**–1**	**1**
7	13	$\bar{X}_7 = 10$	**0**	**0**
9	11	$\bar{X}_8 = 10$	**1**	**1**
11	9	$\bar{X}_9 = 10$	**–1**	**1**
13	7	$\bar{X}_{10} = 10$	**0**	**0**
9	13	$\bar{X}_{11} = 11$	**1**	**1**
11	11	$\bar{X}_{12} = 11$	**2**	**4**
13	9	$\bar{X}_{13} = 11$	**0**	**0**
11	13	$\bar{X}_{14} = 12$	**1**	**1**
13	11	$\bar{X}_{15} = 12$	**2**	**4**
13	13	$\bar{X}_{16} = 13$	**3**	**9**
				$\boldsymbol{SS\bar{X} = 40.}$

This whole calculation is the definition of $SD(\bar{X})$.

$$SD(\bar{X}) = \sigma(\bar{X}) = \sqrt{\frac{SS\bar{X}}{\#\bar{X}'s}} = \sqrt{\frac{40}{16}} = \sqrt{2.5} \approx 1.581.$$

You can interpret the calculations in Equation (3), and Table 6 as: "From sample to sample (of size 2) the resulting $\bar{X}$'s (which are random since the numbers that go into each $\bar{X}$ are random) will (probably) not be the same. However, the $\bar{X}$'s that come from the two rolls tend to be around $E(\bar{X}) = 10$ with it not unusual for an $\bar{X}$ to be off $SD(\bar{X}) = \sqrt{2.5}$ from 10 in a typical case."

There are 16 numbers in the calculation in Equation (3) and in Table 6 for the possible $\bar{X}$ for two measurements. These calculations are not hard to do although maybe more work than one would rather do. However, it is not even necessary to do this amount of work because there are theorems in statistics that give the answer without doing the calculations using the definitions as above. The theorems say that

(4)
$$E(\bar{X}) = \mu,$$
$$SD(\bar{X}) = \sigma/\sqrt{n},$$

where μ and σ are the center and spread of an individual measurement from the measuring device, and n is the number of measurements that go into $\bar{X}$. Here $n = 2$. So instead of doing the calculations of Table 6 we could have gotten the same answer by computing:

$$SD(\bar{X}) = \frac{\sigma}{\sqrt{n}} = \frac{\sqrt{5}}{\sqrt{2}} = \sqrt{2.5} \approx 1.581.$$

[Other symbols for $SD(\bar{X})$ are $\sigma(\bar{X})$ and $\sigma_{\bar{X}}$.] The Appendix has a rough proof of why $SD(\bar{X}) = \sigma/\sqrt{n}$.

Let's be clear about the difference between σ and $\sigma/\sqrt{2}$, σ comes from the possible values produced by the measuring device as in Table 5, while $\sigma/\sqrt{2}$ describes the spread in the possible $\bar{X}$ from the combination of measurements as in Table 6. A possible $\bar{X}$, such as $\bar{X} = 7$, can be farther than one $SD(\bar{X})$ from $\mu = 10$ and a possible $\bar{X}$, such as $\bar{X} = 11$, can be closer than one$SD(\bar{X})$ from μ, but a typical $\bar{X}$ is about a distance of $SD(\bar{X})$ from μ.

The tetrahedrons in this section are hypothetical measuring devices, but not as far from reality as one might think. Suppose we took two measurements with a real measuring device instead of with the pair of tetrahedrons. A tetrahedron can take on only four different values, but a real measuring device can take on many different values. If one takes two measurements with a real measuring device one could construct the analogue of Table 3. The possible $\bar{X}$ for $n = 2$ for measuring the length of the desk with real measuring device might look like that in Table 7.

Table 7: Possible Outcomes for the Average of Two Measurements With a Real Measuring Device

		Second Measurement												
	$\bar{X}$	$9'8''$	$\cdots$	$9'10''$	$\cdots$	$9'11\frac{1}{4}''$	$\cdots$	$10'$	$10'$	$\cdots$	$10'\frac{3}{4}''$	$\cdots$		
First Measurement	$9'8''$	$9'8''$	$\cdots$	$9'9''$	$\cdots$	$9'9\frac{5}{8}''$	$\cdots$	$9'10''$	$\cdots$					
	$\vdots$	$\vdots$		$\vdots$		$\vdots$		$\vdots$						
	$10'$	$9'10''$	$\cdots$	$9'11''$	$\cdots$	$9'11\frac{5}{8}''$	$\cdots$	$10'$	$\cdots$					
	$10'$	$9'10''$	$\cdots$	$9'11''$	$\cdots$	$9'11\frac{5}{8}''$	$\cdots$	$10'$	$\cdots$					
	$\vdots$	$\vdots$		$\vdots$		$\vdots$		$\vdots$						
		$10'\frac{3}{4}''$		$\cdots$				$\cdots$				$\cdots$		
		$\vdots$		$\vdots$				$\vdots$				$\vdots$		

The difference between two measurements with a tetrahedron and two measurements with a real measuring device is that the table is bigger (probably a lot bigger) for a real measuring device. However, the behavior inside Table 7 is the same as the behavior inside Table 3. There will be more combinations where positive measurement errors are paired with negative measurement errors than where both measurement errors have the same sign. *Once you understand simple measuring devices such as the tetrahedrons, you also understand the behavior of real measuring devices!* The formula: $SD(\bar{X}) = \sigma/\sqrt{n}$ applies to the real case. That $SD(\bar{X})$ formula is usually derived with a technical calculus proof that does not give you the intuition that Table 3 does. This finishes $n = 2$ measurements.

To move on, what happens when more than two measurements are taken? Suppose we measure the length of the desk $n = 4$ times with four tetrahedrons and average the four numbers that turn up. Again remember we are trying to measure the true length of the desk $\mu = 10$. To keep track of what is going on with the measurements we use a Black one, a DarkGray one, a MidGray one, and a LightGray one:

There are $4 \times 4 \times 4 \times 4 = 256$ possible ways for the tetrahedrons to come out leading to 256 possible averages. Since the measurements are random any Black measurement can go with any DarkGray measurement, and any MidGray measurement can go with any LightGray measurement. Also any pair of Black, DarkGray measurements can go with any pair of MidGray, LightGray measurements. Table 8 contains the 256 equaly possible ways that $\bar{X}$ can turn out in this new $n = 4$ case. The left margin of Table 8 has the possible Black and DarkGray measurements and the average of the Black and DarkGray measurements. The top margin of Table 8 has the possible MidGray and LightGray measurements and the average of the MidGray and LightGray measurements. The body of the table has the average of each of the 256 possible combinations of the four measurements.

For example, you get $\bar{X} = 13$ as $(13 + 13 + 13 + 13)/4$. You can immediately see that there is a difference between $n = 4$ and $n = 2$. For $n = 4$, $\bar{X}$ can be 7.5 or 8.5 and so on while $\bar{X}$ can only be an integer when $n = 2$. When $n = 4$ there are percentwise even more combinations (compared to $n = 2$) that give an average close to the center $\mu = 10$ (black eclipse) and percentwise even fewer combinations where the average is farther from 10 (gray eclipses). There is more cancelation of the measurement errors for $n = 4$ than for $n = 2$.

Table 8: 256 Possible $\bar{X}'s$ for the Average of the Rolls of 4 Tetrahedrons

Sixteen Possible MidGray And LightGray Combinations with their averages,

Sixteen Possible Black and DarkGray Combinations with their averages.	Possible $\bar{X}$	7 =7,7	8 = 7,9	8 = 9,7	9 = 7,11	9 = 9,9	9 = 11,7	10 = 7,13	10 = 9,11	10 = 11,9	10 = 13,7	11 = 9,13	11 = 11,11	11 = 13,9	12 = 11,13	12 = 13,11	13 = 13,13
7,7	= 7	7	7.5	7.5	8	8	8	8.5	8.5	8.5	8.5	9	9	9	9.5	9.5	10
7,9	= 8	7.5	8	8	8.5	8.5	8.5	9	9	9	9	9.5	9.5	9.5	10	10	10.5
9,7	= 8	7.5	8	8	8.5	8.5	8.5	9	9	9	9	9.5	9.5	9.5	10	10	10.5
7,11	= 9	8	8.5	8.5	9	9	9	9.5	9.5	9.5	9.5	10	10	10	10.5	10.5	11
9,9	= 9	8	8.5	8.5	9	9	9	9.5	9.5	9.5	9.5	10	10	10	10.5	10.5	11
11,7	= 9	8	8.5	8.5	9	9	9	9.5	9.5	9.5	9.5	10	10	10	10.5	10.5	11
7,13	= 10	8.5	9	9	9.5	9.5	9.5	10	10	10	10	10.5	10.5	10.5	11	11	11.5
9,11	= 10	8.5	9	9	9.5	9.5	9.5	10	10	10	10	10.5	10.5	10.5	11	11	11.5
11,9	= 10	8.5	9	9	9.5	9.5	9.5	10	10	10	10	10.5	10.5	10.5	11	11	11.5
13,7	= 10	8.5	9	9	9.5	9.5	9.5	10	10	10	10	10.5	10.5	10.5	11	11	11.5
9,13	= 11	9	9.5	9.5	10	10	10	10.5	10.5	10.5	10.5	11	11	11	11.5	11.5	12
11,11	= 11	9	9.5	9.5	10	10	10	10.5	10.5	10.5	10.5	11	11	11	11.5	11.5	12
13,9	= 11	9	9.5	9.5	10	10	10	10.5	10.5	10.5	10.5	11	11	11	11.5	11.5	12
11,13	= 12	9.5	10	10	10.5	10.5	10.5	11	11	11	11	11.5	11.5	11.5	12	12	12.5
13,11	= 12	9.5	10	10	10.5	10.5	10.5	11	11	11	11	11.5	11.5	11.5	12	12	12.5
13,13	= 13	10	10.5	10.5	11	11	11	11.5	11.5	11.5	11.5	12	12	12	12.5	12.5	13

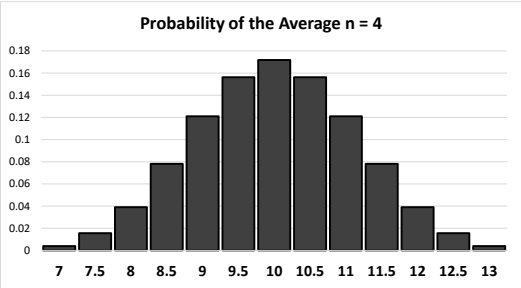
The average $\bar{X}$ again is random variable because rolling the four dice is random, and so that the numbers that go into the average are random. As before the randomness means probability is involved. The random behavior of $\bar{X}$ is described by calculating probabilities from Table 8:

$$
\begin{aligned}
&P(\bar{X}=7)=1/256, \quad P(\bar{X}=7.5)=4/256,\\
&P(\bar{X}=8)=10/256, \quad P(\bar{X}=8.5)=20/256,\\
&P(\bar{X}=9)=31/256, \quad P(\bar{X}=9.5)=40/256,\\
&P(\bar{X}=10)=44/256, \quad P(\bar{X}=10.5)=40/256,\\
&P(\bar{X}=11)=31/256, \quad P(\bar{X}=11.5)=20/256,\\
&P(\bar{X}=12)=10/256, \quad P(\bar{X}=12.5)=4/256,\\
&P(\bar{X}=13)=1/256.
\end{aligned}
\tag{5}
$$

This set of probabilities is called the Sampling Distribution of $\bar{X}$ when *n = 4*.

Again, a distribution is a collection of probabilities (or percentages) that tell you how something behaves. Equation (5) tells us how the average of the four tetrahedrons behaves. There is something to keep in mind in Table 8. Denote the respective random variables as: X_B, X_{DG}, X_{MG}, and X_{LG}. Notice that in the table: $P(X_B=7)=P(X_B=9)=P(X_B=11)=P(X_B=13)=64/256=1/4$, since every entry in the body of the table in rows 1, 2, 4, and 7 have $X_B=7$ and so on. In the same way $P(X_{DG}=7)=P(X_{DG}=9)=P(X_{DG}=11)=P(X_{DG}=13)=64/256=1/4$, $P(X_{MG}=7)=P(X_{MG}=9)=P(X_{MG}=11)=P(X_{MG}=13)=64/256=1/4$, and $P(X_{LG}=7)=P(X_{LG}=9)=P(X_{LG}=11)=P(X_{LG}=13)=64/266=1/4$. Each color behaves according to the measuring device, in other words each color has the same distribution. However, as before having the same distribution does not mean they are always equal. Being equal would mean all four are either all 7, all 9, all 11, or all 13, so that $P(X_B=X_{DG}=X_{MG}=X_{LG})=4/256$. A perusal of Table 8 will show in fact that $P(X_B, X_{DG}, X_{MG}, X_{LG}\ all\ different)=24/256$. How four independent measurements combine through the average, as in Equation (5), is very different from the way the numbers X_B, X_{DG}, X_{MG}, and X_{LG} that go into that average behave. Figure 4 has a histogram of the Sampling Distribution of $\bar{X}$ when $n=4$ from Equation (5):

Figure 4: A Picture of the Distribution of $\bar{X}$ for Rolling and Combining Four Tetrahedrons



Now that there are two Distributions for $\bar{X}$, we can compare the one for $n = 2$ with the one for $n = 4$. While both distributions have the same range 7 to 13, comparing Equation (1) to Equation (5) shows that for $n = 4$ there is more probability closer to 10, the true length of the desk. For example, for $n = 2$ it is found that $P(9 \leq \bar{X} \leq 11) = .625$, while for $n = 4$ it is computed that $P(9 \leq \bar{X} \leq 11) \approx .727$. In addition to comparing probabilities, if you look at Figure 3 and Figure 4 there is another aspect of the probabilities that can be compared, namely the shape of the probabilities. When there are two measurements taken, the probabilities for the average have the shape of a triangle. Now for the average of four measurements the probabilities have a little bit of a bell shape, the shape of the normal curve. This is a general phenomenon when there are many measurements, and not just for this example. More on this will be said in a little bit. Now we use two numbers to summarize the probabilities in Equation (5).

There are 256 numbers in the body of Table 8, and even the sampling distribution in Equation (5) has 13 probabilities. Dealing with this many numbers is starting to become work, so we are looking for a concise way to sum them up (pun intended). To accomplish this we do the $n = 4$ version of Table 6 and calculate the center and spread of the possible $\bar{X}$ (from Table 8) as done in Table 9. The calculations in Table 9 are the definitions of $E(\bar{X})$ and $SD(\bar{X})$ for four measurements.

Table 9: Center and Spread for $\bar{X}$ when $n = 4$

$$Average(\bar{X}) = E(\bar{X}) = \frac{7+7.5+7.5+7.5+7.5+\cdots 12.5+12.5+12.5+12.5+13}{256} = 10 = \mu.$$

This whole calculation is the definition of $E(\bar{X})$.

X_B	X_{DG}	X_{MG}	X_{LG}	$\bar{X}$	$\bar{X}-\mu$	$(\bar{X}-\mu)^2$
7	7	7	7	**7**	–3	9
7	7	7	9	**7.5**	–2.5	6.25
7	7	9	7	**7.5**	–2.5	6.25
7	9	7	7	**7.5**	–2.5	6.25
9	7	7	7	**7.5**	–2.5	6.25
7	7	9	9	**8**	–2	4
⋮	⋮	⋮	⋮	⋮	⋮	⋮
9	9	11	11	**10**	0	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮
11	13	11	11	**12**	2	4
13	13	13	11	**12.5**	2.5	6.25
13	13	11	13	**12.5**	2.5	6.25
13	11	13	13	**12.5**	2.5	6.25
11	13	13	13	**12.5**	2.5	6.25
13	13	13	13	**13**	3	9
						$SS\bar{X} = 320$

256 Rows

This whole calculation is the definition of $SD(\bar{X})$.

$$SD(\bar{X}) = \sigma(\bar{X}) = \sqrt{\frac{SS\bar{X}}{\#\bar{X}'s}} = \sqrt{\frac{320}{256}} \approx 1.118.$$

We wrote down Table 9 because this is the definition of $E(\bar{X})$ and $SD(\bar{X})$, but again doing this was not actually necessary because we could have just used Equation (4) to get $E(\bar{X}) = \mu = 10$ and $SD(\bar{X}) = \sigma/\sqrt{n} = \sqrt{5}/\sqrt{4} \approx 1.118$. To interpret, $\bar{X}$ is a random quantity since the numbers that go into it are random, however $\bar{X}$ tends be around 10 but it is not unusual to be off by about 1.118 from 10 when $n = 4$. An $\bar{X}$ of $\bar{X} = 11$ is a typical $\bar{X}$ because it is within one $SD(\bar{X})$ of $\mu = 10$. An $\bar{X} = 13$ is somewhat unusual because it is about 2.7 $SD(\bar{X})$'s from μ. What is going on in Table 9 is encapsulated in Table 10.

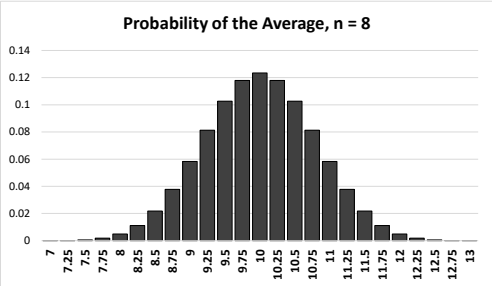
Table 10: A Short Explanation of Table 9

The results of rolls of dice are random. Therefore, the measurements (rolls) X_B, X_{DG}, X_{MG}, X_{LG} are random. The quantity μ is the center of the values that are produced by the measuring device (the measuring device here is a tetrahedron), while the quantity σ is the standard deviation of the values produced by the measuring device.

$\boldsymbol{\sigma}$	measures how far off the random	X_B	tends to be from	μ
$\boldsymbol{\sigma}$	measures how far off the random	X_{DG}	tends to be from	μ
$\boldsymbol{\sigma}$	measures how far off the random	X_{MG}	tends to be from	μ
$\boldsymbol{\sigma}$	measures how far off the random	X_{LG}	tends to be from	μ
$\frac{\boldsymbol{\sigma}}{\sqrt{4}}$	measures how far off the random	$\bar{X} = \frac{X_B + X_{DG} + X_{MG} + X_{LG}}{4}$	tends to be from	μ.

This finishes four measurements. Continuing, suppose eight different tetrahedrons were rolled and the numbers that turn up were averaged. There are $4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4^8 = 65536$ ways $\bar{X}$ can turn out. These possible $\bar{X}$ have been calculated but will not be reported. The probabilities of the various $\bar{X}$ are shown in Figure 5.

Figure 5: A Histogram of the Distribution of $\bar{X}$ for Rolling Eight Tetrahedrons



This shape for the probabilities when $n = 8$ is even more normal (bell shaped) looking than for $n = 4$. This is general and is true for all but the most extreme measuring devices (it will not be true if the measuring device produces measurements according to the probabilities of a Cauchy Distribution, not covered here). This phenomenon is so common that it has been given a name. This is called the Central Limit Theorem. This theorem is the most important and most widely used theorem and result in statistics. Most of the time the shape of the probabilities of $\bar{X}$ becomes more and more normal as n gets bigger. In addition to the normal, the above histogram is summarized using Equation (4). The random $\bar{X}$ tends to be around $E(\bar{X}) = \mu = 10$ but it is not unusual for $\bar{X}$ to be off from 10 by about $SD(\bar{X}) = \sigma/\sqrt{n} = \sqrt{5}/\sqrt{8} \approx .8$ when $n = 8$.

As mentioned before, the exact Distribution of $\bar{X}$ such as that of Equation (1) or Equation (5) or Figure 5 is not used that often. In fact, the real purpose of doing those exact calculations is to demonstrate that the probabilities can be approximated using the normal curve. This implies that the properties of the normal curve can be used to get approximate probabilities. For example, from the 68-95-99.7 Rule for the normal curve: $P\big(E(\bar{X}) - SD(\bar{X}) \le \bar{X} \le E(\bar{X}) + SD(\bar{X})\big) \approx .68$. For $n = 8$, this is $P(10 - .8 \le \bar{X} \le 10 + .8)$ which when calculated exactly (calculations not shown) is $47660/65536 \approx .7272$. In general (except for extreme measuring devices), the Central Limit Theorem states that $P\big(E(\bar{X}) - z_1 SD(\bar{X}) \le \bar{X} \le E(\bar{X}) + z_2 SD(\bar{X})\big)$ is given approximately by the area between z_1 and z_2 on the standard normal curve. Usually in textbooks this is stated in the form:

$$P\left(z_1 \le \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} \le z_2\right) = P(z_1 \le Z \le z_2) \approx N(z_1, z_2)$$

where $Z = (\bar{X} - \mu)/(\sigma/\sqrt{n})$ and $N(z_1, z_2)$ is the area between z_1 and z_2 on the standard normal curve.

A second thing, besides the normal, is going on as n gets bigger in Equation (1), Equation (5), and Figure 5. The Distribution of $\bar{X}$ places more probability toward the center for $n = 4$ than for $n = 2$. While the exact probabilities for $n = 8$ have not been reported it is also true that $n = 8$ has more probability closer to the center than $n = 4$. This

also a general result that holds for all but the most extreme measuring devices. It also has a name. This phenomenon is called the Weak Law of Large Numbers. The Weak Law of Large Numbers states that if you fix a z value then $P(E(\bar{X}) - z \leq \bar{X} \leq E(\bar{X}) + z)$ goes to a perfect probability of 1 as n gets bigger and bigger (for all but the most extreme measuring devices). Some of these probabilities for various values of n are reported in Table 11 (the complete exact Distribution of $\bar{X}$ for $n = 8$ and $n = 16$ have not been calculated in the paper, but a few of these probabilities are stated in Table 11).

Table 11: Probabilities that the Average, from rolling Tetrahedrons, is in Intervals far and close to $\mu = 10$.

	$P(\bar{X} \leq 7.5 \text{ or } \bar{X} \geq 12.5)$	$P(\bar{X} \leq 8 \text{ or } \bar{X} \geq 12)$	$P(9 \leq \bar{X} \leq 11)$	$P(9.5 \leq \bar{X} \leq 10.5)$
$n = 1$	.5	.5	.5	0
$n = 2$	.125	.375	.625	.25
$n = 4$	.039	.117	.727	.484
$n = 8$	.001	.015	.844	.565
$n = 16$	.0000022	.00031	.944	.683

The name Weak Law of Large Numbers should be expanded on. Technically it should be called the Weak Law of Large Numbers (of Observations) since the large numbers in the name does not mean that the data consists of large numbers but rather the data has a large number of data points in it. There is also a Strong Law of Large Numbers, but the strong law requires assigning probabilities to infinite sets of measurements. The Weak Law applies to a finite but increasing number of measurements. The Strong Law is a topic for Ph.D level probability.

To end this section, the formula $SD(\bar{X}) = \sigma/\sqrt{n}$ is a numerical yardstick for how well the sample average measures the true center of a population.

SECTION 2: SAMPLING WITHOUT REPLACEMENT

Sampling with replacement means that when taking a sample of the population the same member of the population can appear more than one time in the sample. Sampling without replacement means a member of the population can appear at most one time in the sample. Section 1 could also be considered as sampling with replacement from the box: $\boxed{7 \quad 9 \quad 11 \quad 13}$.

This population is uniform over 7, 9, 11, 13. In this section we consider the behavior of $\bar{X}$ when sampling without replacement from this population. In this section we find the Distribution of $\bar{X}$ and in particular learn how to find the summaries $E(\bar{X})$ and $SD(\bar{X})$ of the distribution by presenting formulas for calculating them.

If we sample twice without replacement the possibilities are those of Table 2 without the upper left to lower right diagonal as shown in Table 12. There are $4 \times 3 = 12$ possible samples all equally likely, 4 possible for the first measurement then 3 left for the second measurement.

Table 12: The Possible Outcomes and Averages for Sampling Twice Without Replacement

Possible DataPairs		DarkGray Measurement 7	9	11	13
Black Measurement	**7**		**7,9**	**7,11**	**7,13**
	9	**9,7**		**9,11**	**9,13**
	11	**11,7**	**11,9**		**11,13**
	13	**13,7**	**13,9**	**13,11.**	

Possible $\bar{X}$		2nd Measurement 7	9	11	13
1st Measurement	**7**		**8**	**9**	**10**
	9	**8**		**10**	**11**
	11	**9**	**10**		**12**
	13	**10**	**11**	**12.**	

For two measurements without, one of the 12 outcomes is chosen at random and random samples mean as always that probability is involved. For example, from the body of the left table of Table 12, the Black 7 occurs three out of twelve times and the same is true for every other Black and DarkGray number. So $P(Black = 7) = P(Black = 9) = P(Black = 11) = P(Black = 13) = 3/12 = 1/4$, and $P(DarkGray = 7) = P(DarkGray = 9) = P(DarkGray = 11) = P(DarkGray = 13) = 3/12 = 1/4$. We see, as in sampling with replacement, that each

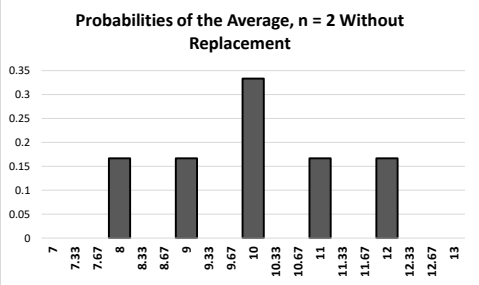
measurement behaves according to the measuring device. How the combination, of the two measurements, behaves via the average, from the right table of Table 12, is given in Equation (6).

$$\text{(6)}\quad \begin{array}{ll} P(\bar{X}=8)=2/12, & P(\bar{X}=9)=2/12, \\ P(\bar{X}=10)=4/12, & P(\bar{X}=11)=2/12, \\ P(\bar{X}=12)=2/12. & \end{array}$$

This set of probabilities is called the Sampling Distribution of $\bar{X}$ with $n=2$ when sampling without replacement.

From the probabilities in Equation (6) a Histogram of the Distribution of $\bar{X}$ is constructed in Figure 6. The measuring device places equal probability at 7, 9, 11 and 13, while the average, $\bar{X}$, of two measurements without replacement also (as sampling with replacement) places probability closer to the center 10 than the measuring device does. Let X be a value produced by the measuring device, then for example we have $P(X=10)=0$ but $P(\bar{X}=10)=4/12$, and again when comparing X to $\bar{X}$ we have $P(9\le X\le 11)=2/4$ but $P(9\le \bar{X}\le 11)=2/3$.

Figure 6: A Picture of the Distribution of $\bar{X}$ for Two Draws Without Replacement, 7,9,11,13 Population



As was done in Section 1 summaries of the Distribution of $\bar{X}$ are obtained from the center and spread of the twelve possible $\bar{X}$, as is done in Table 13. One would expect that sampling without replacement will be less variable than sampling with replacement. This is because when sampling with replacement for $n=2$, $\bar{X}$ can be a distance of 3 from $\mu=10$ if the sample results are 7, 7 or 13, 13, while when sampling without replacement for $n=2$, $\bar{X}$ can be at most a distance of 2 from 10 if the measurement values are 7, 9 or 11, 13. This is evident in Table 13 compared to Table 6. Table 13 has the definition of $E(\bar{X})$ and $SD(\bar{X})$.

Table 13: Summaries of The Distribution of $\bar{X}$, Sampling Without Replacement using Table 12

$$E(\bar{X})=\frac{8+8+9+9+10+10+10+10+11+11+12+12}{12}=10.$$ ← This calculation is the definition of $E(\bar{X})$.

Possible $\bar{X}$'s $\bar{X}$	$\bar{X}$ Deviations from $E(\bar{X})$ $\bar{X}-E(\bar{X})$	Squared Deviations $(\bar{X}-E(\bar{X}))^2$
8	–2	4
8	–2	4
9	–1	1
9	–1	1
10	0	0
⋮	⋮	⋮
10	0	0
11	1	1
11	1	1
12	2	4
12	2	4
		$SS\bar{X}=20.$

Population Standard Deviation of the Possible $\bar{X}'s$

$$SD(\bar{X})=\sqrt{\frac{SS\bar{X}}{\#\bar{X}'s.}}=\sqrt{\frac{20}{12}}=\sqrt{\frac{5}{3}}\approx 1.29.$$

This calculation is the definition of $SD(\bar{X})$.

Similar to Section 1 it is not necessary to do these calculations according to the definitions because there are statistical theorems that give the answers. The theorems, for sampling without replacement, say that

$$\text{(7)}\qquad E(\bar{X})=\mu,\quad SD(\bar{X})=\frac{\sigma}{\sqrt{n}}\sqrt{\frac{N-n}{N-1}},$$

where the inputs μ and σ, are the population average and the population standard deviation as calculated in Table 5. In Equation (7), N is the number of data points in the population and n is the sample size. Here $\mu = 10$, $\sigma = \sqrt{5}$, $N = 4$, and $n = 2$ which from Equation (7) gives $E(\bar{X}) = 10$ and gives

$$SD(\bar{X}) = \frac{\sqrt{5}}{\sqrt{2}}\sqrt{\frac{4-2}{4-1}} = \frac{\sqrt{5}}{\sqrt{2}}\sqrt{\frac{2}{3}} = \sqrt{\frac{5}{3}}, \tag{8}$$

verifying that the formulas give the same value as the definitions. A rough sketch of how you prove this $SD(\bar{X})$ formula for sampling without replacement is given in the Appendix. The proof also gives some intuition into the difference in variability (measured by standard deviations) between sampling with and without replacement.

Next for detailing more properties of sampling without replacement, we compare a sample of size $n = 3$ without to that of a sample of size $n = 2$ without from this population of $N = 4$. Here there are $4 \times 3 \times 2 = 24$ possible samples of size 3 without replacement as reported in Table 14.

Table 14: The Possible Outcomes for Sampling Three Times Without Replacement, 7,9,11,13 Population

Possible Samples		2nd Measurement(DG) & 3rd Measurement(MG)					
1st Measurement Black	**7**	**7,9,11**	**7,9,13**	**7,11,13**	**7,11,9**	**7,13,9**	**7,13,11**
	9	**9,7,11**	**9,7,13**	**9,11,13**	**9,11,7**	**9,13,7**	**9,13,11**
	11	**11,7,9**	**11,7,13**	**11,9,13**	**11,9,7**	**11,13,7**	**11,13,9**
	13	**13,7,9**	**13,7,11**	**13,9,11**	**13,9,7**	**13,11,7**	**13,11,9.**

From the 24 possible sample sets of three numbers laid out in the four rows in the body of Table 14 you can count that the Black number **7** comes up in six of the triplets of numbers, the DarkGray number **7** also appears in six triplets and the same is true for all other numbers in each color. We can conclude:
$P(Black = 7) = P(Black = 9) = P(Black = 11) = P(Black = 13) = 6/24 = 1/4$,
$P(DarkGray = 7) = P(DarkGray = 9) = P(DarkGray = 11) = P(DarkGray = 13) = 6/24 = 1/4$,
$P(MidGray = 7) = P(MidGray = 9) = P(MidGray = 11) = P(MidGray = 13) = 6/24 = 1/4$.

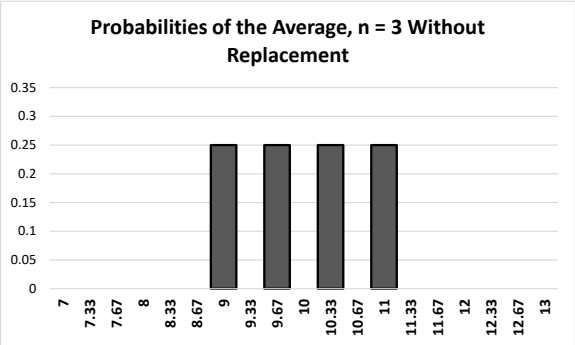
Surprisingly, these probability calculations mean that here when sampling without replacement all three consecutive draws take on the numbers 7, 9, 11, 13 with equal probability. These probabilities match the uniform population where the population members are either 7, 9, 11 or 13. When sampling with replacement the fact that the first draw matches the population is obvious. It is not immediately clear that this would be true for third draw or even the second draw since obviously what happens on the third draw is affected by what has happened on the first and second draws. However, you can think about it in this way. Suppose you take three draws without, but do not look at the first two draws. Soon you will realize that it is possible to get each of 7, 9, 11, or 13 on the third draw. However, given that the draws are totally random none of these numbers are more likely to occur than any other number, all are equally likely on the third draw. The same will be true for the second draw and would be true if we took a fourth draw without replacement. We want to point out that this is a property of sampling without replacement, even though in the beginning it is not at all obvious that this is the case.

In the end we are studying the properties of the average of the draws and not so much on what happens among and between the draws. What happens to the combination of the draws (measurements) via the average when sampling three times without replacement? From Table 14 there are 24 possible samples and with each sample a possible average. However, in this case the arithmetic can be reduced dramatically since we are drawing out all of the population except for one. The sample average then will depend on the member of the population that is left out of the sample, resulting in only 4 possible averages. The possible sample $\bar{X}$ are:

$$\bar{X}_1 = \frac{7+9+11+13}{3} - \frac{13}{3} = 9, \quad \bar{X}_2 = \frac{7+9+11+13}{3} - \frac{11}{3} = 9\frac{2}{3}, \quad \bar{X}_3 = \frac{7+9+11+13}{3} - \frac{9}{3} = 10\frac{1}{3}, \; \bar{X}_1 = \frac{7+9+11+13}{3} - \frac{7}{3} = 11.$$

From this the Distribution of $\bar{X}$ when $n = 3$ when sampling without replacement from the population 7, 9, 11, 13 is:
$P(\bar{X} = 9) = 6/24 = 1/4$, $P\left(\bar{X} = 9\frac{2}{3}\right) = 6/24 = 1/4$, $P\left(\bar{X} = 10\frac{1}{3}\right) = 6/24 = 1/4$, $P(\bar{X} = 11) = 6/24 = 1/4$.
A histogram of this distribution is in Figure 7.

Figure 7: A Picture of the Distribution of $\bar{X}$ for Three Draws Without Replacement from 7,9,11,13



As with sampling with replacement as n gets bigger there is more probability of $\bar{X}$ closer to the Population Mean $\mu = 10$ when sampling without replacement. As with Equation (6) the distribution can summarized with center and spread. As before this is indicated by the quantities $E(\bar{X})$ and $SD(\bar{X})$ which can be calculated from the 24 possible samples or more easily with the 4 possible $\bar{X}$ (as the answer will be the same either way). The center of the possible $\bar{X}$'s, by definition, is:

$$E(\bar{X}) = Expected(\bar{X}) = \frac{9 + 9\frac{2}{3} + 10\frac{1}{3} + 11}{4} = 10 = \mu.$$

The variability in the possible $\bar{X}$'s, by definition, is given by:

Possible $\bar{X}$'s $\bar{X}$	$\bar{X}$ Deviations from $Expected(\bar{X})$ $\bar{X} - E(\bar{X})$	Squared Deviations $(\bar{X} - E(\bar{X}))^2$
9	-1	1
$9\frac{2}{3}$	$-\frac{1}{3}$	$\frac{1}{9}$
$10\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{9}$
11	1	1
		$SS\bar{X} = 20/9.$

$$SD(\bar{X}) = \sqrt{\frac{SS\bar{X}}{\#\bar{X}'s.}} = \sqrt{\frac{20/9}{4}} = \sqrt{\frac{5}{9}} \approx .745$$

Here as before the these calculations can be interpreted as: $\bar{X}$ tends to be around 10 but it is not unusual for $\bar{X}$ to be off by about .75 in a typical case when sampling three times without replacement from 7, 9, 11, 13. The formulas from Equation (7) match the two above calculations (which are the definitions) since $E(\bar{X}) = 10$ and

$$SD(\bar{X}) = \frac{\sigma}{\sqrt{n}}\sqrt{\frac{N-n}{N-1}} = \frac{\sqrt{5}}{\sqrt{3}}\sqrt{\frac{4-3}{4-1}} = \sqrt{\frac{5}{9}}.$$

In real life usually $N \gg n$ so that the factor $\sqrt{(N-n)/(N-1)}$ is approximately 1 meaning that

$$SD(\bar{X}) \approx \frac{\sigma}{\sqrt{n}}.$$

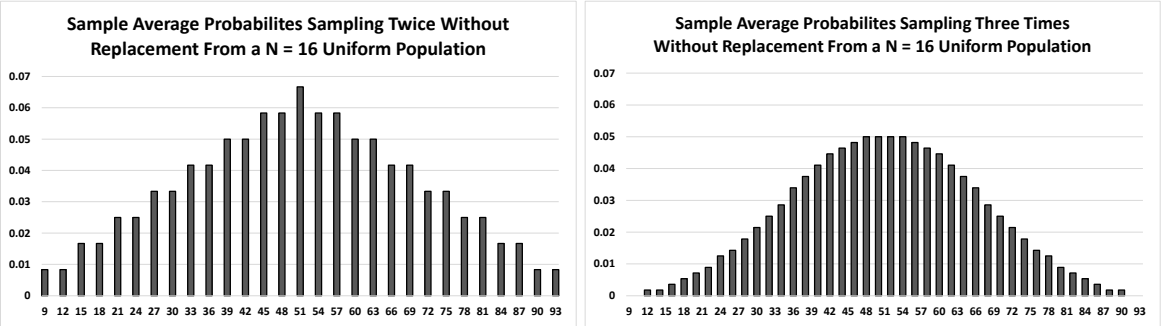
When the sample size is small compared to the population size there is not a material difference between sampling with and without replacement.

There are also versions of the Central Limit Theorem for sampling without replacement. Consider this uniform $N = 16$ population:

6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96

Histograms of the Distributions of $\bar{X}$ when sampling twice and sampling three times without replacement from this uniform population are shown in Figure 8 (probability calculations not shown).

Figure 8: Histograms of the Distribution of $\bar{X}$ for $n = 2$ and $n = 3$ Without Replacement N = 16 Population



It can be proved as long as n is big enough and not too close to N a bell shape will be relevant. [In the second example from the first part of this section where $n = 3$ and $N = 4$, n was too close to N so that the Histogram in Figure 7 is not bell shaped, and in fact is uniform.] As before, also here for $N = 16$ the $n = 3$ histogram has more probability closer to the center than the $n = 2$ histogram.

CONCLUSIONS

We have presented methods and examples for how to teach the sampling distribution of the sample average which we believe are easier for students to understand, as opposed to the presentation currently used in elementary statistics textbooks. These are examples where you can look and see what is going on rather than a professor saying just believe that these formulas for the behavior of the average are correct. Unfortunately for elementary statistics formulas for the sampling distribution of the average are derived with technical calculations that give no intuition about what is going on. Our examples we believe provide enough of this intuition and let you see what the formulas are trying to do and what they mean.

APPENDIX: A ROUGH PROOF OF THE FORMULAS FOR $SD(\bar{X})$

This section shows how a rough proof of the formulas for $SD(\bar{X})$ might be presented in an introductory statistics class. We start with independent measurements as in Section 1 (which could also be sampling with replacement). To minimize the number of calculations but still show what is going on we take an even simpler measuring device than that of Section 1. Suppose we have two colored coins with the numbers 0 and 2 on them.

Black Coin Front Black Coin Back, Gray Coin Front Gray Coin Back

Similar to Section 1 we put colors on the coins so that we can keep track of what happens to the numbers as we do the various calculations for the $\bar{X}$ of the tosses. Colors are back door formulas, instead of using variables x_i and y_j we use Black and Gray numbers, students are used to numbers, their minds don't go blank. Instead of using Σ, putting students to sleep, we use $+$. The things that happen in this simple example also happen in more advanced proofs. The computation of the population mean and population standard deviation for this Black measuring device is shown in Table 15.

Table 15: The Calculation of $E(X) = \mu$ and $\sigma(X) = \sigma$ for the Black Coin

X	$X - \mu$	$(X - \mu)^2$
0	$(0-1) = -1$	$(0-1)^2 = (-1)^2 = 1$
2	$(2-1) = 1$	$(2-1)^2 = 1^2 = 1$
$\mu = 1$		$SSX = (0-1)^2 + (2-1)^2 = 2,$

$$\sigma = \sqrt{\frac{SSX}{\#X}} = \sqrt{\frac{(0-1)^2+(2-1)^2}{2}} = \sqrt{\frac{2}{2}} = 1, \quad \sigma^2 = \frac{(0-1)^2+(2-1)^2}{2}.$$

The calculations will be the same for the gray coin so that we can write: $SSX = SSX$ and $\mu = \mu$ and $\sigma = \sigma$ and can at times eliminate color for these quantities and at times write everything black.

You can think of tossing the above coins as trying to measure the number: $\mu = 1$. Next suppose both the Black and Gray coins are flipped and $\bar{X}$ is calculated from the numbers that turn up. There are $2 \times 2 = 4$ different ways the two coins can come out since any outcome on the Black coin can, call it X_B, can be paired with any outcome on the Gray coin, call it X_G . This gives 4 possible $\bar{X}$'s. The center and part of the spread for $\bar{X}$ are calculated in Table 16 (using the fact that $(a+b)^2 = a^2 + b^2 + 2ab$).

Table 16: The calculation of $E(\bar{X})$ and $SS\bar{X}$ for the Sample Average $\bar{X}$ of the Outcomes of the Two Coins

X_B	X_G	Possible $\bar{X}$	$\bar{X} - \bar{\bar{X}}$	$\left(\bar{X} - \bar{\bar{X}}\right)^2$
0	0	$\bar{X}_1 = \frac{(0+2)}{2} = \frac{0}{2} + \frac{0}{2}$	$\left(\frac{0}{2} + \frac{0}{2}\right) - \left(\frac{1}{2} + \frac{1}{2}\right) = \frac{(0-1)}{2} + \frac{(0-1)}{2}$	$\frac{(0-1)^2}{2^2} + \frac{(0-1)^2}{2^2} + 2\frac{(0-1)}{2}\frac{(0-1)}{2} = \frac{(0-1)^2}{2^2} + \frac{(0-1)^2}{2^2} + 2\frac{1}{2}\frac{1}{2}$
0	2	$\bar{X}_2 = \frac{(0+2)}{2} = \frac{0}{2} + \frac{2}{2}$	$\frac{(0-1)}{2} + \frac{(2-1)}{2}$	$\frac{(0-1)^2}{2^2} + \frac{(2-1)^2}{2^2} + 2\frac{(0-1)}{2}\frac{(2-1)}{2} = \frac{(0-1)^2}{2^2} + \frac{(2-1)^2}{2^2} - 2\frac{1}{2}\frac{1}{2}$
2	0	$\bar{X}_3 = \frac{(2+0)}{2} = \frac{2}{2} + \frac{0}{2}$	$\frac{(2-1)}{2} + \frac{(0-1)}{2}$	$\frac{(2-1)^2}{2^2} + \frac{(0-1)^2}{2^2} + 2\frac{(2-1)}{2}\frac{(0-1)}{2} = \frac{(2-1)^2}{2^2} + \frac{(0-1)^2}{2^2} - 2\frac{1}{2}\frac{1}{2}$
2	2	$\bar{X}_4 = \frac{(2+2)}{2} = \frac{2}{2} + \frac{2}{2}$	$\frac{(2-1)}{2} + \frac{(2-2)}{2}$	$\frac{(2-1)^2}{2^2} + \frac{(2-1)^2}{2^2} + 2\frac{(2-1)}{2}\frac{(2-1)}{2} = \frac{(2-1)^2}{2^2} + \frac{(2-1)^2}{2^2} + 2\frac{1}{2}\frac{1}{2}$

$\bar{\bar{X}} = E(\bar{X}) = \frac{\bar{X}_1 + \bar{X}_2 + \bar{X}_3 + \bar{X}_4}{4} = \frac{\frac{4}{2} + \frac{4}{2}}{4} = \frac{2+2}{4} = \frac{1}{2} + \frac{1}{2} = \frac{\mu}{2} + \frac{\mu}{2} = 1 = \mu,$ $SS\bar{X}.$

So $E(\bar{X}) = \bar{\bar{X}} = (\mu + \mu)/2 = 2\mu/2 = \mu$. Here when averaging the possible $\bar{X}$ you are basically averaging the Black measurement to get μ and averaging the Gray measurement to get μ and then averaging these two averages by dividing by the number of measurements. If there were also a light gray coin, the three measurements would end with $E(\bar{X}) = (\mu + \mu + \mu)/3 = 3\mu/3 = \mu$. It turns out that the calculations will end this way no matter what the measuring device is and no matter how many measurements are taken. This is ultimately how one would prove $E(\bar{X}) = \mu$ in the general case for general n for Equation (4).

Now to finish the calculation of $SD(\bar{X})$, the very last entries on the very right side of Table 16 add up to zero. Anything that is not a square disappears. Only squares remain and they are those squares that appear in the calculation of SSX and σ in Table 15. In this case in Table 16 the last three columns on the right give:

$$SS\bar{X} = \frac{2(0-1)^2 + 2(2-1)^2 + 2(0-1)^2 + 2(2-1)^2}{2^2}. = \frac{(0-1)^2 + (2-1)^2}{2} + \frac{(0-1)^2 + (2-1)^2}{2} = \sigma^2 + \sigma^2 = 2\sigma^2.$$

So for two tosses of a coin, with the numbers 0 and 2 on it, the 4 possible $\bar{X}$ give a population standard deviation (by the definition of a population standard deviation) of:

$$SD(\bar{X}) = \sqrt{\frac{SS\bar{X}}{\#\bar{X}}} = \sqrt{\frac{2\sigma^2}{4}} = \sqrt{\frac{\sigma^2}{2}} = \frac{\sigma}{\sqrt{2}}.$$

This proves Equation (4) for this example. The key to this $SD(\bar{X})$ result is that any term like $1 \cdot 1$ (called a cross product term) is cancelled out in the end in $SS\bar{X}$. The quantity $SS\bar{X}$ is a function of only squares, those that are in $\sigma^2 + \sigma^2$ as in Table 15. [If one were proving this cancellation property with formulas this would be: $\sum\sum(x_i - \bar{x})\left(y_j - \bar{y}\right) = \left(\sum(x_i - \bar{x})\right)\left(\sum(y_i - \bar{y})\right) = (0)(0) = 0$ as done in a more mathematical statistics classes, but which would put introductory students in a bad mood.] If we added a light gray coin, a third measurement meaning $n = 3$, then $SS\bar{X}$ will be a function of $\sigma_B^2 + \sigma_G^2 + \sigma_{LG}^2 = 3\sigma^2$ in $SS\bar{X}$ because all non-squares again disappear and this would end with

$$SD(\bar{X}) = \frac{\sigma}{\sqrt{3}}.$$

A similar thing occurs for n measurements, i.e. n data points. For proving $SD(\bar{X})$ in more advanced statistics in more complicated situations, the proof gets fancier and longer but not really different. The analogue of the very

right side of Table 16 sums to zero in every proof, calculus or not. This is ultimately how one proves that $SD(\bar{X}) = \sigma/\sqrt{n}$ when the measurements are independent.

To see how to prove the formula for $SD(\bar{X})$ when sampling without replacement, let's also consider a simpler example. Take two measurements (draws) without replacement from the population: $\lfloor 1 \quad 2 \quad 6 \rfloor$.

The population parameters are the population mean: $\mu = (1 + 2 + 6)/3 = 3$, and the population standard deviation σ is calculated as always as in Table 17.

Table 17: The Calculation of the Population Standard Deviation: 1,2,6 Population

	Deviations from μ	Squared Deviations
X	$X - \mu$	$(X - \mu)^2$
1	$(1 - 3)$	$(1 - 3)^2$
2	$(2 - 3)$	$(2 - 3)^2$
6	$(6 - 3)$	$(6 - 3)^2$
$\mu = 3$	$Sum = 0$	$SSX = (1 - 3)^2 + (2 - 3)^2 + (6 - 3)^2$

$$\sigma = \sqrt{\frac{SSX}{\#X}} = \sqrt{\frac{SSX}{3}} = \sqrt{\frac{(1-3)^2 + (2-3)^2 + (6-3)^2}{3}} = \sqrt{\frac{14}{3}} \approx 2.16$$

Before calculating $E(\bar{X})$ and $SD(\bar{X})$ from their definition for sampling without replacement some preliminary calculations will be needed. First, note that the sum of the deviations, the second column above, is zero for every data set (as in the Σ formulas for independent measurements above). It is not surprising that when you take away the center from each data point, adding up the deviations will give you zero. So write

$$d = (1 - 3) + (2 - 3) + (6 - 3) = 0.$$

Second, in a little bit we will need to express d^2 in two different ways. One way is easy, since $d = 0$ this means $d^2 = 0$. A second way to express d^2 is obtained by adding up the entries in the body of the next table.

$Row \cdot Column$	$(1 - 3)$	$(2 - 3)$	$(6 - 3)$
$(1 - 3)$	$(1 - 3) \cdot (1 - 3)$	$(1 - 3) \cdot (2 - 3)$	$(1 - 3) \cdot (6 - 3)$
$(2 - 3)$	$(2 - 3) \cdot (1 - 3)$	$(2 - 3) \cdot (2 - 3)$	$(2 - 3) \cdot (6 - 3)$
$(6 - 3)$	$(6 - 3) \cdot (1 - 3)$	$(6 - 3) \cdot (2 - 3)$	$(6 - 3) \cdot (6 - 3)$.

Since $a \cdot b = b \cdot a$ and with adding similar terms we can rewrite the above table as:

$Row \cdot Column$	$(1 - 3)$	$(2 - 3)$	$(6 - 3)$
$(1 - 3)$	$(1 - 3)^2$ +	$2(1 - 3) \cdot (2 - 3)$ +	$2(1 - 3) \cdot (6 - 3)$
$(2 - 3)$		+ $(2 - 3)^2$ +	$2(2 - 3) \cdot (6 - 3)$
$(6 - 3)$			+ $(6 - 3)^2$ = 0.

This gives the result: $2(1 - 3)(2 - 3) + 2(1 - 3)(6 - 3) + 2(2 - 3)(6 - 3) = -(1 - 3)^2 - (2 - 3)^2 - (6 - 3)^2$.

Write this last formula as: $ASSX = 2(1 - 3)(2 - 3) + 2(1 - 3)(6 - 3) + 2(2 - 3)(6 - 3) = -SSX$, where we call $ASSX$ "Anti-SSX". To keep track of what the calculations below eventually do to the numbers add some color and write:

(7) $$ASSX = 2(1 - 3)(2 - 3) + 2(1 - 3)(6 - 3) + 2(2 - 3)(6 - 3) = -SSX,$$
$$ASSX = 2(1 - 3)(2 - 3) + 2(1 - 3)(6 - 3) + 2(2 - 3)(6 - 3) = -SSX.$$

Now for $E(\bar{X})$ and $SD(\bar{X})$ for sampling twice without replacement from the population 1, 2, 6, we want to verify Equation (7) using the definitions of $E(\bar{X})$ and $SD(\bar{X})$. This is done in Table 18. In this example $N = 3$, $n = 2$ and there are $3 \times 2 = 6$ possible samples. Equation (7) for this example reduces to:

$$E(\bar{X}) = \mu = 3 \quad \text{and} \quad SD(\bar{X}) = \frac{\sigma}{\sqrt{n}}\sqrt{\frac{N-n}{N-1}} = \frac{\sqrt{SSX/3}}{\sqrt{2}}\sqrt{\frac{3-2}{3-1}} = \frac{\sqrt{SSX/3}}{\sqrt{2}}\sqrt{\frac{1}{2}} = \frac{\sqrt{SSX/3}}{\sqrt{4}} = \sqrt{\frac{SSX}{12}}$$

where σ is from Table 17. In Table 18, X_B is the first draw from box, and X_G is the second draw from the box.

Table 18: Calculating $E(\bar{X})$ and $SD(\bar{X})$ for an Example of Sampling Without Replacement

X_B	X_G	Possible $\bar{X}$	$\bar{X} - \bar{\bar{X}}$	$\left(\bar{X} - \bar{\bar{X}}\right)^2$
1	2	$\bar{X}_1 = \frac{1}{2} + \frac{2}{2}$	$\frac{(1-3)}{2} + \frac{(2-3)}{2}$	$= \frac{(1-3)^2}{2^2} + \frac{(2-3)^2}{2^2} + \frac{2(1-3)(2-3)}{2^2}$
1	6	$\bar{X}_2 = \frac{1}{2} + \frac{6}{2}$	$\frac{(1-3)}{2} + \frac{(6-3)}{2}$	$= \frac{(1-3)^2}{2^2} + \frac{(6-3)^2}{2^2} + \frac{2(1-3)(6-3)}{2^2}$
2	6	$\bar{X}_3 = \frac{2}{2} + \frac{6}{2}$	$\frac{(2-3)}{2} + \frac{(6-3)}{2}$	$= \frac{(2-3)^2}{2^2} + \frac{(6-3)^2}{2^2} + \frac{2(2-3)(6-3)}{2^2}$
2	1	$\bar{X}_4 = \frac{2}{2} + \frac{1}{2}$	$\frac{(2-3)}{2} + \frac{(1-3)}{2}$	$\frac{(2-3)^2}{2^2} + \frac{(1-3)^2}{2^2} + \frac{2(2-3)(1-3)}{2^2} = \frac{(2-3)^2}{2^2} + \frac{(1-3)^2}{2^2} + \frac{2(1-3)(2-3)}{2^2}$
6	1	$\bar{X}_5 = \frac{6}{2} + \frac{1}{2}$	$\frac{(6-3)}{2} + \frac{(1-3)}{2}$	$\frac{(6-3)^2}{2^2} + \frac{(1-3)^2}{2^2} + \frac{2(6-3)(1-3)}{2^2} = \frac{(6-3)^2}{2^2} + \frac{(1-3)^2}{2^2} + \frac{2(1-3)(6-3)}{2^2}$
6	2	$\bar{X}_6 = \frac{6}{2} + \frac{2}{2}$	$\frac{(6-3)}{2} + \frac{(2-3)}{2}$	$\frac{(6-3)^2}{2^2} + \frac{(2-3)^2}{2^2} + \frac{2(6-3)(2-3)}{2^2} = \frac{(6-3)^2}{2^2} + \frac{(2-3)^2}{2^2} + \frac{2(2-3)(6-3)}{2^2}$

$$\bar{\bar{X}} = \frac{\bar{X}_1+\bar{X}_2+\bar{X}_3+\bar{X}_4+\bar{X}_5+\bar{X}_6}{6} = \frac{\frac{18}{2}+\frac{18}{2}}{6} = \frac{9+9}{2\cdot 3} = \frac{3}{2} + \frac{3}{2} = 3 = \mu \qquad SS\bar{X} = \frac{2\text{SSX}+2\text{SSX}+\text{ASSX}+\text{ASSX}}{2^2} = \frac{2SSX}{4} = \frac{SSX}{2}$$

where SSX is from Table 17 and $ASSX$ is from Equation (7).

So here, as in sampling with replacement, $\bar{\bar{X}} = E(\bar{X}) = (\mu + \mu)/2 = 2\mu/2 = \mu$. If you look close at the calculation of $\bar{\bar{X}}$ you are again just averaging the values of the Black measuring device to get μ and averaging the values of the Gray measuring device to get μ then averaging these averages by dividing by the number of measurements. This calculation for the average extends to sampling without even when sampling more than two times. So $E(\bar{X}) = \mu$ when sampling without replacement.

Now for calculating $SD(\bar{X})$ we have, from Table 18, that $SD(\bar{X}) = \sqrt{SS\bar{X}/\#\bar{X}} = \sqrt{(SSX/2)/6} = \sqrt{SSX/12}$, as was to be shown. In the general case in $SS\bar{X}$ the amount of SSX and the amount of $ASSX$ balance out exactly in such a way as to prove the validity of the formula for $SD(\bar{X})$ in Equation (7). It turns out that the relations that make the formula work in the above simple sampling without replacement example are the same relations that make the formula work in the general case.

It is interesting to compare the calculations when sampling with replacement to those when sampling without replacement. Sampling without replacement is less variable than sampling with replacement for the reasons given between Figure 6 and Table 13 in Section 2. These words imply that $SD(\bar{X})$ and $SS\bar{X}$ are smaller for sampling without. The sampling without replacement $SS\bar{X}$ in Table 18 is a function of SSX and $ASSX$. For sampling with replacement, the $ASSX$ are zero instead of negative making $SS\bar{X}$ bigger for sampling with. The SSX sums squared terms such as $(X_R - \mu)^2$, the quantity $ASSX$ sums what are the cross product terms $(X_R - \mu)(X_B - \mu)$. In sampling with replacement $ASSX$ is zero as in the very right of Table 16. In fact $ASSX$ for sampling with is the $d^2 = 0$ above. The $ASSX$ is negative for sampling without replacement as in Equation (7) because it is missing some of positive terms of the $d^2 = 0$ terms. If $ASSX$ were set to zero in $SS\bar{X}$ in Table 18, $SD(\bar{X})$ would reduce to the sampling with replacement case. For the two draws in Table 18, if $ASSX = 0$ then $SS\bar{X}$ would be $4SSX/4 = SSX$ and $SD(\bar{X})$ would be $SD(\bar{X}) = \sqrt{SS\bar{X}/\#\bar{X}} = \sqrt{SSX/6} = \sqrt{SSX/3}/\sqrt{2} = \sigma/\sqrt{2}$, since $\sigma = \sqrt{SSX/3}$ for the population as in Table 17. The fact that $ASSX$ is negative for sampling without replacement reduces $SS\bar{X}$ and $SD(\bar{X})$ relative to sampling with replacement.

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BIOGRAPHY

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Developing a Real-World Organizational Change Proposal in your MBA Organizational Design and Development Course

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ABSTRACT

All students in the MBA Program at Ashland University take a course in Organizational Design, Development and Change Management. The majority of students in the MBA Program are working adults in professional occupations who take one or two courses at a time. This core course explores the theories and concepts managers can apply, on their own or in collaboration with an Organization Design consultant, to drive effective change management initiatives within their departments or organizations. The course explores how positive change can be created and enacted at the systems level through understanding the elements of organizational design as it relates to performance management. Students learn techniques that would be effective if they were to serve as internal consultants in their organizations or external consultants assisting other businesses. This is achieved by preparing an organizational change proposal, often referred to as an intervention, which combines theory and practice.

KEYWORDS: Organizational design, change management, intervention proposals

INTRODUCTION

The author of this article is the lead professor for the Organizational Development, Design and Change Management in Ashland University's MBA program. Ashland University is a small, private university in the Midwest. This is a core course for all students in the MBA program. The student learning outcomes for the course are stated as follows in the syllabus.

Learners are expected to:

1. Demonstrate an understanding of organizational development (OD), its goals, values, theories, and methods
2. Assess the key issues involved in design interventions.
3. Recognize organizational culture and how it impacts the change process.
4. Explore ways of enhancing performance management as an OD initiative.
5. Apply methods for initiating and managing change through a real-world intervention proposal.

It is the fifth item on this list that serves as the students' final project for the course. Throughout the course, students learn the types and models of interventions and how to categorize and implement their interventions for the proposal they produce at the end of the course.

The purpose of an intervention proposal

The purpose of the intervention project is to help students gain experience in managing and understanding the dynamics of short-term, positive, planned change through goal setting and implementation strategy. This project is loosely based on Robert Schaffer's book, *The Breakthrough Strategy.* Schaffer's project model utilizes short-term successes to build high-performance organizations.

According to Schaffer, in his book, there are five barriers to performance improvement:

1. Psychological Myopia: Viewing the world in ways that are comfortable and reassuring.

2. Wasteful Work Patterns: Shaping work patterns to stay with familiar routines to avoid anxiety-producing situations.
3. Weak Performance Expectations: Asking employees for less than they are capable of to avoid uncomfortable situations.
4. Misuse of Work Management Disciplines: The tendency to be casual or cynical about work planning, measurement, and tracking procedures.
5. Invisible Conspiracy: The Underside of Corporate Culture: Debilitating patterns that are reinforced by formal and informal mechanisms. (Schaffer, 1988, p. 19)

While this theory originated decades ago, it still rings true today. Often, organizations fail because managers become complacent about making significant changes and/or creating new plans and procedures to improve performance. There is a lack of proactive initiative to properly maintain the status quo or identify and anticipate potential problems, not to mention plan for future growth.

Managers occasionally feel that the first step in improving performance is finding new programs or making quantum leap changes to produce results. Not everyone is amenable to change. There are always those who fear change, because frequently change is not introduced properly, or the internal or external consultant is not skilled enough to carry it out. It takes the right consultant to convince employees that their jobs are not in jeopardy and that there is real benefit for them if they make the change.

In this author's Organizational Design course, students are taught how to diagnose issues from a managerial point of view and a consultant's perspective. An adept organizational design specialist or consultant should possess analytical thinking, personnel development abilities, research skills, persuasion skills, leadership skills, and communication skills. They are not only responsible for diagnosing, but also implementing a plan, and doing proper follow up to make sure the change lasts.

Business leaders often bring in external consultants and pay substantial fees to produce initiatives when they could work within their own confines to achieve improvement within existing systems and structures. The decision to do so is occasionally based on a lack of trust in employees already in place to carry out such an initiative. Sometimes, the changes are unattainable or unrealistic. There are other times when the right person is simply not armed with the skill level or expertise to make the change properly.

> As Robert Schaffer stated in his 2010 *Harvard Business Review article*, "Everyone has seen senior managers announce major directional changes or new goals without spelling out credible plans for achieving them or specifying who's accountable; for instance, "We are going to reduce the use of cash by 40% next year" or "We are going to cut train accidents significantly" or "We are going to shift focus from midmarket customers to the upper end during the next two years." Such efforts go nowhere." (Schaffer, 2010, p. 1).

One thing is certain. A change should be made strategically, and a business strategy plan or proposal is the way to implement such a change realistically. Changing the work culture often means changing both individual and collective behaviors of people at the workplace. (Williamson, 1997, p. 3).

The preparation of the organizational change proposal

In the change proposal for this Organizational Design, Development, and Change course, students complete their change initiative in stages throughout the course.

The professor requests that students plan to implement, or actually implement, the interventions that they create for the course in their organizations. For those students who are not currently working, they are encouraged to do extensive research on a company that they are familiar with, identify a process or procedure that needs improvement, and create a specific proposal for change based on the outline provided.

Organizational Change Outline

1. Brief History of the company
2. SWOT analysis breakdown
3. Identification of area(s) needing to be corrected or improved and individuals or departments involved
4. Urgent, Compelling Need for Change (Describe why this change is necessary)
5. Diagram the current organizational structure.
6. Describe the intended project. Identify the following:
    - Type and model of intervention
    - Developmental or design oriented
    - Individual, group, or organizational intervention
    - Method of data collection: Surveys, observation, interviews, etc. to collect data.
7. Smart Objectives:
    - Specifics: Short-Term and Long Term Goals
    - Measurable, Bottom-Line Results
    - Achievement
    - Resources for Change
    - Timeline
8. Expected Result
    - Forecasted Improvement on productivity and/or other variables
9. Follow Up: Specify when and how follow up will be conducted to make sure the initiative is consistently successful in the next three to six months.

As one can see from the outline, after a situation is identified, and a thorough SWOT analysis has been conducted, students must identify a type and model for solving their issue.

When the author refers to intervention type utilized in this change plan, she is referring to a choice of four types: Human resource management intervention, human process intervention, techno-structural intervention, and strategic intervention. Since this project is to be completed in three to six months, the professor discourages the use of strategic interventions, because these interventions typically involve a much longer period of time. Examples of strategic interventions would be a merger, alliance, or cultural change. The remaining three interventions are easily carried out in a shorter time frame, since they refer to people, process, or design issues.

Students also must select a model to work through the issue. The models that students may choose from include the General Model of Change, ADKAR Model, Action Research Model, Positive Model, Appreciative Inquiry Model, Kurt Lewin's Three-Step Model of Change, and Kotter's Eight-Step Model, all of which are covered extensively in the course.

The four-stage General Model is focused on the organizational processes used for the change. The Action Research Model provides a model for enacting action-oriented approaches to inquiry, applying small scale theorizing to specific problems in specific situation (Stringer & Aragon, 2020).

The ADKAR model of change is based on five very basic elements that fall naturally one after the other, and it can be used in various venues (Hiatt, 2006). The Appreciative Inquiry Model is based on the principle that positive organizational futures can be reached through collective involvement and methods that "affirm, compel, and accelerate anticipatory learning" (Cooperrider et al., 2008). The Positive Model is similar in nature and thought to the AI model.

Kotter's eight-step Model is used to introduce change mainly to the management of a company. It more extensive than some of the other models. People focused in nature, it is a structured approach that helps companies to diffuse employee resistance, which is the most common barrier to change.

Finally, Kurt Lewin's Three-Step Model of Change is used frequently by students because of its sheer simplicity. The concept of unfreeze, movement, and refreeze is an old one that has been around for decades but is still in use today.

The type of data collection is especially important for an accurate portrayal of problem and solution. Such methods might include survey, observation, collection of unobtrusive data, statistical pre- and post-data analysis. The professor encourages students to use documentable proof of before and after scenarios in order to convince superiors in an organization that an effective change can only be achieved with accurate measurement.

Creating SMART objectives are next in the process. These objectives are not only used in business proposals, but they are also used in education. Student centered learning methods can take a considerable amount of time on the instructor's part. SMART objectives are routinely used in project management and education (Blumberg, 2009). These objectives ensure that critical content is being delivered in an efficient and effective manner.

In their study of SMART objectives, Authors Wolf and Akkaraju (2014) suggested that standard SMART guidelines call for designing relevant objectives in the sense that they are aligned with an overall goal or plan. It is this idea of tying an intervention to a plan that makes the use of a proposal for a class project feasible.

Students' final change proposals culminate with a discussion of actual proposed project outcomes and forecasted percentages of improvements. Students offer conclusions and recommendations for specific follow-up at regular intervals.

Conclusion

The preparation of an actual work project can make an MBA class come alive. The author of this article has had consistently high evaluations in the course for five years. A number of MBA students have entered the consulting profession after taking this course because they have feel they have attained the proper tools to begin that venture. Numerous other students have implemented the projects in their work environments and received promotions as a result of their efforts. The author has found that the more engagement that students can relate to personally and professionally, the more enriching the course experience becomes for them.

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Managing in the Virtual Workplace: A Student Role-Play Consulting Project

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ABSTRACT

This paper presents a student role-play consulting project that focuses on managing in the virtual workplace. It is a two-part project that requires students to analyze and critically think about how management needs to change in order to adapt to the virtual workplace of today and the future. Part I is an individual assignment where students are required to research how and why the workplace has become more virtual and write a paper based on their findings. Part II is a group assignment in which students work in teams to develop and present new management theories that are applicable to the virtual workplace.

Keywords: management role-play, student project, virtual workplace

INTRODUCTION

The industrial revolution changed the way work was done in the United States and led to the need for systematic management and the development of management theory. As the country moved into the information age, much of the way we work was transformed once again. While the industrial revolution moved work out of the homes and into factories, the information age enabled employees to work virtually from anywhere, including their homes. Information technology has made it possible for organizations to become virtual workplaces and for years we have been experiencing an increase in the number of employees who work remotely and/or as part of a virtual team.

According to the U.S. Census Bureau (2017), 5.2% of workers in the United States worked from home on a full-time basis in 2017. In addition, 23% of US employees worked from home at least some of the time ("Workers," 2018). The number of remote workers significantly increased in the last year due to the pandemic. Lockdowns, quarantines, and worry about the workplace spread of COVID-19 pushed many companies to allow or require their workers to work remotely. According to a survey by the Pew Research Center, 20% of US employees worked remotely before COVID-19 and that number increased to 71% during the pandemic (Parker et al., 2020). Furthermore, 54% of those working from home would like to continue doing so post-pandemic (Parker et al., 2020).

It is predicted that many of the employees in the U.S. will continue working from home after the pandemic. According to a survey by McKinsey Global Institute, 38% of global business executives reported that they expect their remote workers to work away from the office two or more days a week after the pandemic (Lund et al., 2020). They note that this would be more common in better developed countries such as the U.S. Therefore, one would expect the percentage to be even higher in the United States. For companies that switched their employees from being office-based to home-based during COVID-19, more than a third of them expect it to be more common when the pandemic ends (Bartik, et al., 2020). This will have a profound impact on how work is done and the importance of remote workers and virtual teams.

As part of a comprehensive management education, it is important for students to understand these changes to how we work and how management theory has developed and changed historically as well as how it will continue to change into the future. In the management courses we teach, we cover many theories of management, including theories of management principles, motivation, and leadership. We feel it is important for students to understand the historical significance of how and why those theories were developed, but also that the way we work has not stayed the same. Therefore, for years we have been assigning a "management in the future" project, where students develop new theories to manage the virtual workers of today and the future. With the increase in the number of employees working virtually as a result of the pandemic, this project is more relevant than ever. We now will discuss how we run the project in our classes.

PROJECT OVERVIEW

The project has two parts that require students to analyze and critically think about how management needs to change in order to adapt to the virtual workplace of today and the future. The premise for the assignment is presented to the students as the following:

> The CEO of the XYZ Corporation (we each use our own last name) is looking to hire a consulting team to take the organization into the future. As a consulting team that is being considered for the job, your team needs to give a presentation to the top management of the corporation. Your task is to help them understand how work and management have changed and will continue to change with the advent of the virtual workplace. The process will consist of two parts.

Part I is an individual assignment where students are required to research how and why the workplace has become more virtual and write a paper based on their findings. Part II is a group assignment in which students work in teams to develop and present new management theories that are applicable to the virtual workplace. Parts I and II will be discussed below.

PART I: INDIVIDUAL PAPER

Part I is to be done separately by each student in the class. Each student will write and submit a paper involving the preliminary research necessary to later develop the theory for the team presentation. The team theory will then be developed based on the information found in the individual papers. We use the following as the prompt for the individual paper:

> As we have discussed in class, the industrial revolution changed the way work was done in the United States. It also led to the need for systematic management and the development of management theory. Currently the United States in the information age where have seen many changes to the world of work and management with the workplace becoming more virtual. Specifically, how has information technology changed work (when, where, and how we work)? What do these changes mean for managers in the virtual workplace?

In terms of further instructions for the students we usually tell them that their papers should be between 1200 and 1500 words in length, although instructors can make the assignment any length they choose. We require students to use at least five credible sources published within the last five years. An alternative, that we have used, to having students write an individual paper is to have students submit extensive notes. Once students have completed their individual research, they begin work on Part II of the project.

PART II: TEAM PRESENTATION

Part II is a role play activity based on the premise that students are part of a consulting team that is competing to get a consulting job. The hiring organization is looking for a team that can help them to learn to better manage in the virtual workplace. We use the following prompt for Part II:

> The CEO of the XYZ Corporation (we each use our own last name), is looking to hire a consulting team to take the organization into the future. As a consulting team that is being considered for the job, your team needs to give a presentation to the management of the corporation. Your task is to present them with theories, that if implemented in their organization, will enable them to successfully manage in the virtual workplace. Your team's theories should be general theories that you could present to any organization. If the XYZ Corporation hires you, you would then work with them to develop specific ways to implement your team's theories in their organization.

Teams of students are formed to work together as a consulting team. We find that teams of 4 students work well, but have used teams of 3 to 5. Teams can be put together in whatever way the instructor prefers (e.g., self-selection, counting off, instructor choice, team generator). Before the teams make their presentations, they are given time to work together on theory development and presentation preparation.

Theory Development. Over the course of the semester in our courses students have learned about theories of leadership, principles of management, and motivation. Most of these theories have been around for quite some time and were developed before the virtual workplace became so prevalent. Teams are told that since the XYZ Corporation is looking for some new ideas to help them better manage now and in the future, each team will develop three new theories that address the realities of the virtual workplace that they researched and wrote about in Part I. Teams are told they need to develop original theories that are their team's own ideas. Teams are presented with the following prompt to develop their theories:

A. Principles of Management Theory: What are the important principles for managers in the virtual workplace? Develop a theory of management principles for the virtual workplace. Your theory should include 6-8 principles.
B. Motivation Theory: How should the manager of the virtual workplace motivate workers? Develop a motivation theory which addresses employee needs and motivational techniques and programs.
C. Leadership Theory: What should be the dominant leadership style of a manager in the virtual workplace? Come up with a name for your leadership style and describe it.

We allow student teams to work on developing their theories during class time. We usually give them one week's worth of time, approximately 2 ½ hours, to do so. We tell teams that if they need extra time they can also meet outside of class to finish developing their theories and to put together their PowerPoint. We find that by having student teams work on their theories in class they will brainstorm and develop them together instead of each taking a theory and working on it separately. In addition, since each student has written an individual paper on the virtual workplace in Part I, they are all well prepared to contribute ideas to the team's theory development. After the teams have finished with the theory development we have them give their presentations.

Consulting Presentations. Students are told to keep in mind the purpose of the presentation. That although the individuals in the audience may look like their classmates, everyone is playing a role and they should think of themselves as consultants presenting to managers of the XYZ Corporation. Teams are reminded that the XYZ Corporation's managers will be selecting one of the consulting teams to lead them into the future and therefore, in addition to hearing about the team's theories, they will also be interested in understanding why their theories are needed in the virtual workplace and how their theories will help them be better managers. In other words, why they should hire their consulting team.

Each team's presentation should be about 15 minutes long, after which we allow about 5 minutes for questions. Students are told they should approach it as a professional presentation, dressing appropriately and using PowerPoint or other materials they feel would be appropriate in getting their points across. We also require that each team member presents.

Choosing the Winner. As part of the role play, we have students in the audience (who are playing mangers of the corporation) vote on which consulting team should get the job. Students are told that they will not be allowed to vote for their own team. To facilitate the voting we have each student take notes during the presentations for which they are in the audience acting as management. They are told to make comments on each presentation and to rate each presentation on a scale of 1-10, 10 being an excellent presentation. At the conclusion of the presentations, each student can then refer to their comments and ratings to compare groups and choose the one they think is most deserving of the consulting job. We have also used the comments to provide peer feedback to the student teams.

Assessment. Students are graded on the presentation as a team. Everyone on the team receives the same grade on the presentation unless adjustments have to be made to an individual's grade based on peer assessments or attendance. Peer assessments are used to give each student the opportunity to assess the performance of their team members (including themselves) in Part II of the project. In addition, attendance is required for all of the theory preparation and presentation days of the project.

CONCLUSION

This student consulting project has been used successfully in our management courses for many years. We have found it to be a valuable assignment to aid in the development of students' written and oral communication skills,

teamwork skills, and critical thinking skills. Students also find value in the activity and have submitted comments on course evaluations such as: (a) “I am amazed at how much I learned from the project and its applicability to the real world.” (b) “Working on the group project generated interest in the course material by making us think and compare today’s world vs. management of the past and how it has changed.” (c) “Project was very helpful for future managers. It prepared you for the outside world.” The project’s relevance has increased significantly during the current pandemic with more employees working remotely and serving on virtual teams. Our students will be entering into a workplace that is notably different from before the pandemic, with the use of virtual teams becoming a permanent fixture in many organizations. Therefore, the development of the skills from this exercise is both important and timely.

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Cohort Programs and the Implication for Business Graduate Programs

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ABSTRACT

This paper investigates the relationship between graduate business programs and the use of cohorts. The empirical results demonstrate that these cohort programs have significantly higher retention and graduation rates than the average university in the United States. With increasingly greater demands on private universities, it is becoming more important to retain recruited students. The paper will illustrate that these cohort programs can offset trends in declining enrollments. The paper will examine a Corporate Sponsored Executive MBA, Fast Track MBA program, Master of Finance, and an Executive MBA program. Using 389 – 464 observations, the authors find that retention and graduation rates are statistically higher than the national Business School average, assuming the highest standard deviation from the authors' study. This is surely an underestimate of the true volatility of the comparative national data set, yet the data set finds a statistically significant difference (p-value< 0.01) between the data sets. This has strong implications for administrators attempting to maintain enrollments and retention rates.

Keywords: graduate business programs, cohort learning, graduate retention rates

INTRODUCTION

This paper investigates the relationship between cohort programs and retention rates. The authors demonstrate that the use of cohort format has a positive effect on program retention rates in graduate programs. This result is consistent for a graduate Corporate Sponsored Executive MBA program in Management (100% graduation rate), a Fast-Track MBA in Finance and Marketing (100% graduation rate) program, Masters in Finance program (86% graduation), and the Executive MBA program (76% graduation rate). The programs are similar with a cohort format, but each one of the programs have unique characteristics.

The Corporate Sponsored MBA in Management is a cohort program where the students attend in person on numerous weekends throughout the year. It is a 54-credit program. It is a corporate sponsored program funded by the firm. The faculty from various departments work together throughout the program as a team. The weekend residences are held on the corporation site and all the students work at the firm at that site.

The Fast-Track MBA in Finance and Marketing is a cohort program where the students spend approximately four days with the faculty from different disciplines to reacquaint the students with various materials. The program is a 39-credit program completed over one year. To be eligible for the program, the students must have graduated with a 3.25 GPA from an AACSB accredited business school. If the student has over a 3.50 GPA, the GMAT requirement is waived. Once the semester starts, the students are enrolled together in traditional core MBA courses taught by a variety of faculty in the Business School. The Academic Director and Director of Graduate Advisement monitor the students and host the students once a semester for lunch. The Finance majors in the program take all their courses together. Although predominately a Finance program, students enrolled in the Marketing concentration also attend all classes as a cohort.

The Masters in Finance is a cohort program that meets in residency every 8 weeks and students spend the weekend with the faculty. In between residencies, the faculty use collaborative videos and conference calls to communicate with the students. There is also a group project. Each class is worth six credits and usually has two faculty members teaching the classes. There are no GMATs required for admission, rather there is a structured personal interview with the Director and Academic Director of the program. When the students attend the residency weekends, they are provided hotel rooms and the students have all their meals together with the faculty. The faculty teaching in the program work as teams throughout the cycle. There has only been one change in faculty over the ten years of the program's existence.

The Executive MBA (EMBA) program is structured in a very similar way to the Masters in Finance program. There are nine modules in the program each being ten weeks long. This accounts for the program's 54 credits. There are

also no GMATs required for admissions to the program, replaced again by a structured interview from the Director and Academic Director. Although the retention rate in this program is still higher than the national average, it is lower than the other three programs being discussed. The authors attribute this to the declining support of corporate sponsorship.

Using t-statistics related to mean differences the authors found that all of the four cohorts performed better that the overall national average of graduate business programs. All the cohorts were statistically significant at the 0.01 level. The authors also found that certain cohorts analyzed in this paper had statistically significant differences when it came to mean difference tests related to each other.

LITERATURE REVIEW

The practices, impact, challenges, and benefits of cohort learning has been the focus of researchers for over 25 years. The research has focused on the students' different fields of study, the community developed within the groups, the role of faculty members, the impact of student success and retention, and methods of content delivery. Burnaford and Hobson (1995) evaluated Masters of Education field-based programs where students would meet together over 22 months, meeting every four weeks. The program's student body was made up of 15 primary and secondary teachers with ranging areas of expertise and experience. In this case, the curriculum varies from year to year with both faculty and students influencing the areas of study to meet the needs of those enrolled. They found that once an environment of trust was established within the cohort the students were more willing to push their limits, experiment with the content of the course, and refine their approach in their careers. The influence of the cohort even extended to the students' evaluations. Due to the students' unique position of being teachers, there was often a feeling of isolation from their peers within their professional relationships, but the cohort arrangements allowed feedback from peers that can be provided by no other perspective.

While the cohort arrangement is beneficial for the students, it can often be challenging for the faculty members. Each cohort is assigned two faculty members that remain with the group throughout the duration of the program. In this structure, the faculty can often feel isolated from their peers and a daunting responsibility for their students' success. Additionally, these long-term assignments can have a direct impact on the students' perception of the program. While the students may have influence on the direction of topics and learning, it is ultimately the responsibility of the faculty members to meet the curricular demand of the program.

Similarly, Lamb and Jacobs (2009) found that the faculty members play a significant role in student and program success when a cohort model is used. The focus of their research was a two-year graduate program for mathematics teachers in grades kindergarten through middle school. This qualitative study surveyed twenty-three students at the end of the program to assess the students' perceptions of the program's effectiveness and the specific features that had the biggest impact. Most of the students found the program improved their teaching practices, leadership skills, and ability to assess their students, but while the cohort format provided the opportunity for success, it doesn't ensure that the program remains coherent throughout the duration. The researchers found it is up to the faculty to create this coherence through a discussion of values, goals, pedagogical approach, and using each course as a steppingstone into the next. This approach required a link between semesters and assignments that crossed multiple courses.

In attempting to better understand how cohort-based students performed in a Master of Arts Criminal Justice Administration program, Perez, Fegadel, and Bromley (2016) research the background factors that lead to academic success and the professional improvements students had after graduation. The researchers used a quantitative approach to determine the significance of the students' background information and their academic success. The factors that were associated with a higher GPA included employment in law enforcement, higher level of professional experience, higher undergraduate GPA, and students closer to their undergraduate graduation. The cohort based approached seemed to have little impact on students' academic success but did have advantages for digesting the materials, navigating the higher education environment, and establishing relationships that would impact their professional careers.

As programs and colleges buy-in to the cohort model for its perceived benefits for student success, it is important to consider any negative effects cohorts have in the learning process and how they impact the professors. Lei, et.al. (2011) research how membership in a cohort as a student and instructor effect the pedagogical and educational implications of this model. For students, many of the benefits are relational in nature and include a strong cohort

culture, supportive peers, closer relationships with faculty members, and stronger social and professional networks. The research also found there are some negative possibilities with this approach. Structurally, a cohort-based learning model provides little flexibility and almost no customization in the area of study. Other problems for students included the development of cliques, unhealthy levels of academic competition, limited interactions with students not part of the cohort, and intellectual mismatches resulting in stunted growth of knowledge or freeloaders in the classroom. For the instructors, the benefits include easier student advisement, easier dissemination of information, and more positive relationships with the students. However, faculty members also struggle with the lack of flexibility, experience isolation from the student group, and may have negative implications of being too familiar with the cohort. The researchers suggest that further research needs to be done on the faculty members' role within the cohort model and specifically within cohort relationships.

Establishing trust and faculty involvement have shown to have positive impacts to the cohort learning model, but Swayze and Jakeman (2014) evaluated the impact of having to merge two previously closed cohorts into one new group. The researchers focused on the students experience with learning and communication within a group of doctoral students. Due to financial necessity, a cohort with eleven students was merged with one made of four students. All 15 students were invited to participate in this qualitative, interview-based research, but a total of ten students representing both cohorts participated. Prior to the merge, students experienced the common bond and trust seen in other cohort studies. They not only connected in the classroom, but also continued communicating outside of formal meetings with technology accelerating their conversations and deepening their bond as a group. Despite advance notice to the students and considerations made by the faculty, the students still perceived an impact on the cohort's level of communication and overall group behavior. While some students expressed some optimism prior to the merge, ultimately it resulted in changed classroom behavior, less exploration and inquiry of the topics, and an overall feeling of discomfort and concern. The research suggests that once students have established group norms, the ability to change those norms are negatively impacted. It also suggested that the negative perceptions of the students directly impacted the overall learning outcomes. This research suggested a greater level of involvement from the faculty is necessary beyond the considerations that were given during the transitions. Attention needs to be given to social introductions, learning environments, and collaborative assignments.

As we begin to see technology play a role in student communications, it also begins to impact the delivery method of course materials. Rausch and Crawford (2012) evaluated the best practices of the University of Tennessee at Chattanooga's graduate programs that used cohort-based delivery. Specifically, UTC's doctoral program in learning and leadership evolved into a cohort-based program with an executive delivery format where students would meet for concentrated weekend sessions, but participate in asynchronous learning while outside of the classroom. This approach tries to take the best from the in-person learning and marry it with a learning management system that truly creates an online classroom. The researchers found that under these circumstances the faculty member plays a key role in the learners' success. They must go beyond the development of discussions boards to strategically create a learning community with active participants. It is foundational to success that faculty establish the social aspect of the group and that they "foster the deeper interaction desired in a program of higher learning" (p 177). Once this foundation has been laid, the learning management system can be used to further the relationships between students as well as with the faculty. The researchers conclude that faculty are crucial in developing the trust, creating a sense of community, and playing the role of a supporter and facilitator that will result in students' success. As an example of this success, UTC has a retention/completion rate over 95%.

Russell, Kleiman, Carey, and Douglas (2009) also evaluated different delivery methods involving cohorts. Their focus was on a professional development course for middle school teachers. The researchers compared the learning outcomes of four online learning groups. The first cohort was provided a high level of support which included an instructor, online facilitator, and asynchronous peer communication via a learning management system. Another group was self-paced through the course with none of the support resources provided to cohort one. The final two groups were provided intermediate support. This research took a quantitative approach using pre and post surveys and exams. Surprisingly, their findings showed the outcomes of the post-test were not significantly improved by the additional support provided. According to the researchers, this suggests that if the course is designed well to begin with, faculty and cohort interactions may not have as significant impacts on student learning. This study is a snapshot of one course and does not discuss how these influences could impact students in an ongoing program.

Alman, Frey, and Tomer (2012) on the other hand researched how cohort-based learning impacted online students in a Master of Library and Information Science degree program. They compared the attitudes and perceptions of a strictly online cohort to a traditional on campus group of students. The researchers used the *Community of Inquiry*

Survey to measure the social presence, teaching presence, and cognitive presence perceived by the students. This survey instrument allowed the researchers to take a quantitative approach with the project. The authors surveyed 19 cohort members and 17 traditional students. Not only did the cohort-based group perceive a positive influence in all three factors, but they also found the course activities and discussions increase their interest in the subject and reported a higher degree of rigor in the online format.

Conrad (2005) also considered the impact and perception of community among master's level, cohort-based online learners. The researcher took a qualitative approach using a pre-program questionnaire with follow up surveys and focus groups to gather the data. Seventeen students agreed to participate in the study, but rates varied during the collection process. Initially, learners' understanding of community focuses on their classroom participation in the technical, online arena. However, overtime the idea of community became more relationally based with multiple stakeholders beyond the students involved. Group development greatly depended on the activities and support of faculty members and administrators. Over the course of the program, it became clear that the instructors had the greatest impact on community. Poor and absentee instructors had an overall negative impact on the students' purpose and motivation.

Mauldin, Narendorf, and Mollhagen (2017) dove deeper into evaluating the community among a cohort-based Master of Social Work program by researching their academic, friendship, and professional ties. The aim of the research was to clearly define social ties, determine if demographic factors such as age, race, or ethnicity played a role in the initial development of relations, and how this evolved over time. This study took a quantitative approach surveying 144 students at the beginning, middle, and end of a fall semester. At the beginning of the semester, almost 25% of the students in the cohort reportedly knew at least one other student. By mid-terms, 98% of students had at least one connection with the average relationships being 8.6. As the semester came to an end, 99.3% of students had at least one connection with the average number of relationships increasing to 10.2. Students reported that being a member of the cohort had a significant impact on their ability to develop these relationships. Students in non-cohort based MSW programs reported significantly lower social ties, while demographic factors had no significant impact on relationship development. The study gave little consideration to the role of faculty in the development of these ties.

METHODOLOGY AND DATA SAMPLE

The empirical results are based on data from one university. The university is an AACSB accredited business school. The authors received the information used in this paper from the graduate admissions office. Moving forward, the authors will be using Qualtrics to expand the response rate. In this study, we had 197 observations from the Executive MBA, 198 observations from the Masters in Finance, 33 observations from the Fast-Track MBA, and 36 observations from the Corporate Sponsored MBA related to enrollment. We had 150 observations from the Executive MBA, 170 observations from the Masters in Finance, 33 observations from the Fast-Track MBA, and 36 observations from the Corporate Sponsored MBA related to retention. These numbers are indicative of the longevity of the various programs. These cohort programs use their own recruiting process and meet with faculty members prior to joining the program. This helps with the quality of the students recruited but does not explain why the retention rate in the cohorts were so high.

The tables in the paper are related to enrollment rates, graduation rates, retention rate, and p-values related to mean difference tests. We provide the retention rates for all the programs and compare them to the national average. The authors did not use a university-based comparison since the retention rates in the cohort programs biased the numbers upwards. We did provide information on a national average and found that the results were significantly different. The cohort programs in this study had a much higher graduation rate and were statistically significant.

EMPIRICAL RESULTS

According to the National Association of Student Financial Aid Administrators (2017), the national graduation rate for students enrolled in Masters level programs was 61%. The U.S. News and World Report (2017) found that MBA students fared slightly better with a success rate of 63%.

Table 1 reports the information for the Masters in Finance program. There were 197 students enrolled and 170 students graduated from the program with a retention rate of 86% over the 10 years of the program. Table 2 reports the date for the Executive MBA program. There were 198 students enrolled and 150 students graduated from the

program with a retention rate of 76% over the last 12 years of the program. Table 3 reports the information for the Fast-Track MBA. There were 36 students enrolled and 36 students graduated from the program with a retention rate of 100% over the 4 years of the program. Table 4 reports the data for the corporate sponsored MBA program. There were 33 students enrolled and 33 students graduated from the program with a retention rate of 100% over the 2 years of the program.

Table 1: Masters of Finance

Cycle	Students Enrolled	Graduated	Retention Rate
1	19	17	89%
2	23	20	87%
3	38	29	76%
4	16	13	81%
5	16	13	81%
6	19	17	89%
7	18	17	94%
8	21	20	95%
9	10	9	90%
10	17	15	88%
Totals	197	170	86%

Table 2: Executive MBA

Cycle	Students Enrolled	Graduated	Retention Rate
1	20	14	70%
2	27	24	89%
3	20	15	75%
4	23	15	65%
5	19	16	84%
6	12	7	58%
7	13	9	69%
8	13	9	69%
9	16	13	81%
10	14	11	79%
11	12	9	75%
12	9	8	89%
Totals	198	150	76%

Table 3: Fast-Track MBA

Cycle	Students Enrolled	Graduated	Retention Rate
1	4	4	100%
2	12	12	100%
3	11	11	100%
4	9	9	100%
Totals	36	36	100%

Table 4: Corporate Sponsored Executive MBA

Cycle	Students Enrolled	Graduated	Retention Rate
1	20	20	100%
2	13	13	100%
Totals	33	33	100%

Table 5 presents the mean differences and t-statistics for the Masters in Finance versus the Executive MBA. The Masters in Finance had statistically significant differences in enrollment, graduation rate, and retention rates at the 0.01 level. The enrollment rate and graduation rate significance can be attributed to the larger mean class size in the Masters in Finance program. The lower mean for the Executive MBA can be partially attributed to the decline in corporate funding for Executive MBA programs nationally. Many years ago, students could only attend an Executive MBA program if it was sponsored by their company. The retention rate significance can be attributed to numerous factors. Although the programs are structured very similarly with weekend residencies, the Masters in Finance is a one-year, 36-credit program and the Executive MBA program is a twenty-month, 54-credit program. The main differences are the longevity of the Executive MBA program and the composition of the students. The students in the EMBA are older than the students in the Masters in Finance program and slightly more demanding. This is based on one of the authors having been academic director of both programs in previous years.

Table 5: Masters of Finance vs Executive MBA

	Students Enrolled	Graduated	Retention Rate
Count	395	320	320
Mean Difference	4.75	5.75	0.11
Variance	0.40	0.30	0.00
t-statistic	7.48***	10.44***	12.36***

Notes: p-value results: *,**,***Significant at 0.10, 0.05, and 0.01 levels, respectively

Table 6 compares the Masters in Finance and the Fast-Track MBA program. The results illustrate that the Masters in Finance program is statistically significant at the 0.01 level for the enrolled and graduated students. This is attributed to the fact that the Masters in Finance has larger class sizes and has been around for a longer period of time. Fast Track MBA was statistically significant at the 0.01 level for retention rate. This is attributed to the 100% retention rate of the Fast-Track MBA. Table 7 provides a comparison of the Masters in Finance to the Corporate Sponsored MBA program. The results are similar to what the authors found in Table 6. The Masters in Finance was significant at the 0.01 level for enrolled students and at the 0.05 level for graduated students. The Corporate Sponsored MBA was significant at the 0.01 level for the retention rate. Again, this was attributed the 100% retention rate of the Corporate Sponsored MBA.

Table 6: Masters of Finance vs Fast-Track MBA

	Students Enrolled	Graduated	Retention Rate
Count	233	206	206
Mean Difference	12.25	9.25	-0.13
Variance	0.61	0.50	0.00
t-statistic	15.65***	13.02***	-25.64***

Notes: p-value results: *,**,***Significant at 0.10, 0.05, and 0.01 levels, respectively

Table 7: Masters of Finance vs Corporate Sponsored Executive MBA

	Students Enrolled	Graduated	Retention Rate
Count	230	203	203
Mean Differences	4.750	1.750	-0.13
Variance	1.003	0.895	0.00
t-statistic	4.74***	1.85**	-25.64***

Notes: p-value results: *,**,***Significant at 0.10, 0.05, and 0.01 levels, respectively

Table 8 compares the Executive MBA to the Fast-Track MBA. The EMBA is statistically significant at the 0.01 level related to enrolled students and the 0.01 level for graduated student. This was attributed again to the larger class size in the Executive MBA. The Fast Track was statistically significant at the 0.01 level for retention rate. This was attributed to the 100% retention rate of the Fast-Track MBA. Table 9 compares the Executive MBA to the Corporate Sponsored MBA. The t-static for mean difference is 0 because the programs had the same average number of students. For the graduated mean difference, the Corporate Sponsored MBA was statistically significant at the 0.01 level. The Corporate Sponsored MBA was also statistically significant at the 0.01 level for the retention rate. Obviously, the effect of full corporate sponsorship played an important role is these findings. Table 10 compares the Fast-Track MBA and the Corporate Sponsored MBA. The Corporate Sponsored MBA was statistically significant at the 0.01 level for enrollment and graduation. This is related to the larger class size of the Corporate Sponsored MBA program. The t-statistic for the two programs is 0. This is related to the 100% retention rate for both programs.

Table 8: Executive MBA vs Fast-Track MBA

	Students Enrolled	Graduated	Retention Rate
Count	234	186	186
Mean Difference	7.50	3.50	-0.25
Variance	0.49	0.50	0.00
t-statistic	10.66***	4.94***	-31.92***

Notes: p-value results: *,**,***Significant at 0.10, 0.05, and 0.01 levels, respectively

Table 9: Executive MBA vs Corporate Sponsored Executive MBA

	Students Enrolled	Graduated	Retention Rate
Count	231	183	183
Mean Differences	0.00	-4.00	-0.25
Variance	0.89	0.89	0.00
t-statistic	0.00	-4.23***	-31.92***

Notes: p-value results: *,**,***Significant at 0.10, 0.05, and 0.01 levels, respectively

Table 10: Fast-Track MBA vs Corporate Sponsored Executive MBA			
	Students Enrolled	Graduated	Retention Rate
Count	69	69	69
Mean Differences	-7.50	-7.50	0
Variance	1.09	1.09	0
t-statistic	-7.17***	-7.17***	0
Notes: p-value results: *,**,***Significant at 0.10, 0.05, and 0.01 levels, respectively			

Table 11 is probably the most important table in this paper. It contrasts the university's cohort programs to the national average of MBA programs. To establish the statistics of the MBA programs, it was reported by U.S. News and World reports that the retention rate was 63% for MBAs in the United States (Friedman, 2017). To test the comparison of the Executive MBA variance to the national average, we assume the same variance. The true variance of the national average was considerably higher because of the lower retention rate in these programs. The authors used the number of responses from a survey conducted by studyusa.com that in 2019 there were over 1,000 MBA programs in the United States (Browne, 2020). Even with those favorable statistics for the national average, the authors found the results of the cohort program were all statistically significant at the 0.01 level. The results of the Corporate Sponsored program is not recorded because it generated the same results as the Fast Track MBA. These results demonstrate clearly that cohort programs are a stronger methodology than transitional MBA's. These results strongly support the findings of this paper that cohort programs are very beneficial. Administrators should be cognizant of these results.

Table 11: Cohort Programs vs National Average			
	Mean Difference	Variance	t-statistic
MS Finance	0.238	3.184E-05	42.18***
EMBA	0.123	5.425E-05	16.72***
Fast-Track MBA	0.37	8.966E-06	123.56***
Notes: p-value results: *,**,***Significant at 0.10, 0.05, and 0.01 levels, respectively			

CONCLUSIONS

This paper demonstrates the advantages of cohort program formats in graduate MBA programs and a Masters in Finance program. The results demonstrate that nuances in the various programs led to statistically significant retention rates. As somewhat expected, the Corporate Sponsored MBA program had a 100% retention rate. The authors believe this was primarily related to the fact that the tuition was completely paid for by the corporation and everyone in the program worked for the same company. The Fast-Track MBA program also had a 100% retention rate. This is explained by the authors because all admitted students were from AACSB schools and received a discount for having to take fewer classes due to introductory courses being waived. The nature of the program allowed students to take the majority of their classes together. The Executive MBA program had the lowest retention rate and the authors attribute this to the longevity of the program and that the university does not provide scholarships.

The authors feel that the most significant finding of this paper is how all of the cohort programs were statistically significant at the 0.01 level compared to the national average for traditional MBA programs. This is very important to administrators at the graduate level. It is obvious that this is an important policy to attempt to incorporate these cohort programs at times of low retention rates. Future research investigates the difference between first and second generations of college students and the impact of the Coronavirus on student learning.

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Learn, Play, Design: Using the Escape Room Concept to Teach Creativity and Innovation in a Business Course

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ABSTRACT

Educational Escape Rooms (EER) have significantly increased over the past four years., The publications of business-related EERs, however, are limited despite the value to organizations in developing key soft skills. This paper describes a multi-activity approach using the concept of escape rooms in a business creativity and innovation course. Students were engaged in learning about escape rooms, hearing from an escape room owner, playing a professional escape room, and then designing escape rooms in small groups. The key findings indicated the students self-reported an increase in the business skills of critical thinking, creativity, and innovation. Teamwork also ranked high. These findings are similar to research published in other disciplines. However, as a result of examining the EER literature, it is recognized there needs to be more research done on business-related EERs.

Keywords: escape room, creativity, innovation, design, business

INTRODUCTION

Business schools have used games and play in various forms in the classroom for a long time, but in recent years there has been an increase in the use of escape rooms (Moules, 2019) It has been recognized that educational escape rooms (EER) can increase essential soft skills that are desired by organizations, such as teamwork, creativity, critical thinking, and communication to name just a few.

One of the earliest and most cited documents on escape rooms was published by Scott Nicholson in 2015. He defines escape rooms as "live-action team-based games where players discover clues, solve puzzles, and accomplish tasks in one or more rooms in order to accomplish a specifical goal (usually escaping from the room) in a limited amount of time" (Nicholson, 2015, p. 1). In that paper, he also noted the first activity referring to an escape room/game was created in Japan in 2007.

Since then, escape rooms have exploded in popularity, spanning Asia to Europe and then eventually to the United States in 2012 with estimates now approaching 50,000 escape rooms across the world (Ferguson, 2019). Nicholson (2015) originally focused his research on recreational escape rooms. However, since that paper, escape rooms have become more prevalent in education because they assist in the teaching of non-technical skills (soft skills) as well as technical (i.e., hard skills; Ouariachi & Wim, 2020; Rosenkrantz et al., 2019). As a result, more academic research has been conducted on EERs in the past few years but it is still limited, especially when related to business education.

To show breadth and to spark curiosity for educators, the following literature review gives an overview of various types, methods and implementation of escape rooms in higher education. Recreational and non-higher education escape rooms are not examined. The author then explains a multi-activity lesson using escape rooms in a business-related creativity and innovation course. A post-survey of the students was conducted to examine the benefits of EERs in a business course.

LITERATURE REVIEW

Types of Educational Escape Rooms

Even before the concept of EERs, game-based learning (GBL) had been around in education for a number of years. Qian and Clark (2016) describe GBL as a way to enhance knowledge and skills acquisition through game play involving solving puzzles and challenges while increasing a sense of achievement. GBL related research was rooted in the digital realm but research in the non-digital application has seen an increase due to the rise of EER (Fotaris & Mastoras, 2019). Also prior to EERs, a similar concept of serious games was implemented in classrooms which have shown to enhance learning and engagement as well (Franco & DeLuca, 2019).

An EER is defined differently from regular escape rooms. In general, EERs are developed for a specific target group with well-defined learning goals (Veldkamp, 2020). Furthermore, Fotaris and Mastoras (2019) define EERs as "an instructional method requiring learners to participate in collaborative playful activities explicitly designed for domain knowledge acquisition or skill development so that they can accomplish a specific goal (e.g., escape from a physical room or break into a box) by solving puzzles linked to unambiguous learning objectives in a limited amount of time" (p. 236).

Recent literature reviews on the industry content of EERs show the majority of articles are based in higher education with an overwhelmingly large focus on health care, followed by STEM subjects and social sciences (Fotaris & Mastoris, 2019; Taraldsen et al., 2020; Veldkamp, 2020). EER research in health care is by far the largest with varying topics (Guckian et al., 2020). Specific topic examples include surgery (Kino et al., 2019), pharmacy (Eukel et al., 2019), nursing (Adams et al., 2018), radiology (Lui et al., 2020) and dentistry (Aubeux et al., 2020) just to name a few. The second largest area of EER research is in the STEM/STEAM realm with examples such as computer science (Borrego et al., 2017), engineering (Ross & Bennett, 2018), manufacturing (Berthod et al., 2019), and technology (Sanchez-Martin et al., 2020). Furthermore, Eukel et al. (2020) show that EERs can be "adaptable and transferable for use with any course or disciplines" (p. 167). For example, but not limited to: chemistry (Dietrich, 2018), English (Lopez-Pemos et al., 2019), technical writing (Melo & Johnson, 2018), entrepreneurship (Martina & Göksen, 2020), and even for the library (Simms, 2019).

Through the analyses of EERs articles, themes emerged for educators to take note of when considering implementation of an EER in the classroom. The following are a few of the pedagogical advantages found in the literature.

Pedagogical Advantages of Escape Rooms

Escape rooms fit well into higher education with many benefits and can enhance the learning experience of students (Wise et al., 2018). Similarly, Berthod et al. (2020) note that their "escape room simulation in education improve both technical (skills) and nontechnical (communication) knowledge" (p. 854). The importance of enhancing the highly desired nontechnical skills (interpersonal skills and creative thinking) of students has been highlighted by both employers (Baird & Parayitam, 2019) and business schools (AACSB, 2020a). The following skills are highlighted as they are related the subsequent class lesson using escape rooms.

Creativity and Innovation

The importance and learning outcomes related to creativity and innovation were mentioned in many, if not most of the reviewed articles on escape rooms. To concur with the importance, AACSB's (2020b) 2020 Guiding Principles and Standards for Business School Accreditation, creativity and innovation are recognized as key elements in developing the lifelong learning mindset in students. Furthermore, creativity and innovation skills are important aspects to the growth of businesses and economies. Lee and Benza (2015) state that innovation is a driver to this growth in which a diverse skill set will be needed; however, business programs are lacking in this area and need to improve in developing students' innovation capabilities.

Teaching creativity in business school has been well researched (Eisner, 2017; Schlee & Harich, 2014). Even though creativity is highly desired, the use of escape rooms in business schools to teach creativity is very low based a review of literature. Prior to the use of escape rooms in education, Simonton (2012) noted that professors need to be creative in teaching creativity. The use of escape rooms is a more recent example of how to be creative in teaching creativity.

Furthermore, Hoidn and Kärkkäinen (2014) outline categories of skills necessary for innovation. The three categories are technical (hard skills and knowledge of a discipline), thinking and creativity (critical thinking, problem solving, curiosity) and social and behavioral skills (communication, teamwork, leadership, engagement). All three of these categories have been noted in some fashion as positive outcomes in various EER research articles. Furthermore, Torres and others (2020) reiterated the point stating, "soft skills are essential skills for students' active learning of innovation, namely allowing them to develop their creativity, autonomy, communication, teamwork and cooperation, self-assessment, critical thinking, and so on" (p. 33).

Additional Soft Skills

Beyond creativity and innovation, many studies indicate additional benefits of EER regarding soft skill development. Morrell et al. (2020) research supported other researchers' findings of increased teamwork and

collaboration, communication, problem solving, critical thinking and active listening, as did (Terrasi et al., 2020). Other researchers have indicated EERs can develop curiosity (Martens & Crawford, 2019), motivation (Borrego, 2017), engagement (Davis, 2019), empathy (Moules, 2019), and awareness (Pan et al., 2017).

Student Design of Escape Rooms
The initial implementation of escape rooms in education focused on the teacher/professor designing the escape rooms and various models have since been developed (Botturi & Babazadeh, 2020; Eukel & Morrell, 2021; Reuter et al., 2020). There are even organizations creating escape rooms and providing resources for the classrooms such as Breakout Edu, Stanford d.school and escapED (Clarke et al., 2017).

A part of the examined escape room lesson in this paper shows student groups not only played escape rooms, but they created them. In 2001, Bloom's 1956 taxonomy was revised placing *create* at the highest level of student learning, replacing *synthesis* (Armstrong, 2010). Rosenkrantz et al. (2019) also identified the pedagogical value in students as designers. In relation to business, Collopy and Yoo (2015) reasoned for the need of design to be taught to future managers.

Play and Fun
One last aspect of escape rooms to be addressed is the reference to play and fun. Escape rooms started out primarily as a fun game, eventually progressing into the education realm. Nevertheless, the fun aspect did not go away and was mentioned in numerous articles. However, very similar to the limited research on EERs in business, Purinton and Burke (2019) note that fun increases engagement and improves learning outcomes but is light on examples within business courses. Moules (2019) also referenced how business schools have used play and games to enhance learning including the more recent EERs.

The above literature review highlighted aspects the professor thought as important to the following design of the overall lesson: learn about escape rooms, play, then design – all while enhancing soft skills and having fun.

LESSON DESIGN

Course and pre-survey
A series of escape room activities were implemented in a Creativity and Innovation course starting in the eighth week of the semester. Because of COVID-19 social distance requirements, the course was considered FlexSync, which means some students were in-person while some were on Zoom at the same time. The course mostly consisted of senior and junior business students (N=35) with a minor in Entrepreneurship and Innovation. Included were two non-business students with an interdisciplinary game design major.

A short pre-lesson survey was given to the students to gather information on their experiences with escape rooms as well as asking to define an escape room. The information was used to put students into teams for the design phase of the activity by balancing the experienced students with those who had not participated in an escape room. There were 20 students who had never participated in an in-person escape room, while 10 participated only once and five 2-3 times. Another question asked if they had participated in an online escape room and there were 32 who never participated. The following are the results of two open-ended questions categorized by qualitative software.

Q2: What is an escape room?
The overarching Q2 themes reported by the students (N = 35) were game/puzzle/clues (87%), cooperation/teamwork (31%), time restraint (14%), and critical thinking (9%). Overall, most students understood the underlying concept and goals associated with an escape room. Many stated that they knew of its game-like elements and puzzle/clue-like tasks designed to get the player out of a locked room. Almost a third of students identified that escape rooms require some amount of teamwork and cooperation with others in order to complete the tasks. Some even related escape rooms to team building activities designed to improve interaction among colleagues. Finally, a small percentage of student mentioned the time restraint inherit in many escape rooms. An even smaller percentage of students spoke of the critical thinking and problem-solving skills associated when completing an escape room.

Selected student quotes from Q2:
- It's an activity where you and group get together and attempt to creatively escape a maze-like room through problem solving and critical thinking

• An escape room is a game played in groups where the main objective is to find answers/clues to escape the room in a timely manner for you to win the game.
• It is a room with challenges that you work together on to try to get out.
• Is a place where you go with a group of people and then get locked up in a room and your team's task is to figure out how to get out with different clues that are scattered all around the room.
• A room that you have to try and find clues and put them all together in order to escape the room.

Q4: Since you have participated in an escape room, what are your thoughts?
Only the students who had participated in an escape room were asked this question. The overarching Q4 themes reported by the students (N=15) were enjoyment (73%), engagement with others (33%), and depends (20%). Of the students who indicated that they had previous experience engaging withing an escape room, the majority mentioned having a positive experience and general enjoyment with their escape room experience. Similar themes emerged of having fun as well as the puzzle solving features. Another theme identified from these responses was associated with the amount of engagement one has with their teammates. These students find escapes rooms the most fun with others but often times find it less enjoyable when their teammates do not participate or if there are too many people in the escape room. Finally, a small number of students revealed that their enjoyment of an escape room depends on many different factors. Some identified attending escape rooms with younger kids or boring themes as root causes for their dissatisfaction.

Daily Lesson Design
The overall escape room lesson lasted three weeks in which the course met twice a week. During this time, the lesson had a multi-activity approach consisting of five different activities in which the students participated. Below are the activities for each of the days.

- Day 1 – Introduction to escape rooms and watch informational/history video. Played three short escape room/puzzles in breakout groups on Zoom. Discussed challenges and highlights
- Day 2 – Class presentation by an alumnae owner of local escape room. Topics covered: history of escape rooms, various types, personal experiences with starting an escape room, COVID-19 challenges/impact, finances
- Day 3 – Students participated in an escape room led by a professional company on Zoom (90 minutes)
- Days 4-5 – Students divided into 5 groups of 7 students and were given instructions to create an online escape room similar format to the one they participated in. The groups were given two days for in-class group design work time. They had a total 12 days to complete the project
- Day 6 – Played/participated in four 20-minute escape rooms designed by the student teams. A fifth escape room was recorded and the class members watched it outside of class. The students evaluated each presentation

Unfortunately, for various reasons there were seven students who did not attend the professional escape room activity on Day 3. It was decided that those seven students would make up the fifth group for the design phase. Their designed escape room was recorded because they did not experience how to facilitate a live, online escape room.

The following instructions were given to the class which consisted of five groups:

- Pick one or two members of the group to be the host and lead the class through the escape room activity like the escape room facilitators did in our last class.
- Create a theme and an overall challenge for the groups to escape or solve the problem within 15-20 minutes
- Must have at least three (3) puzzles/riddles that create clues which lead to a final answer/escape
- The facilitators for each group will have access to professor's Zoom as host so you can create breakout rooms
- Narrate at the being in to set the stage
- You will be graded on creativity, performance, professionalism, and teamwork. It will be evaluated by the class, by your teammates, and by the professor.

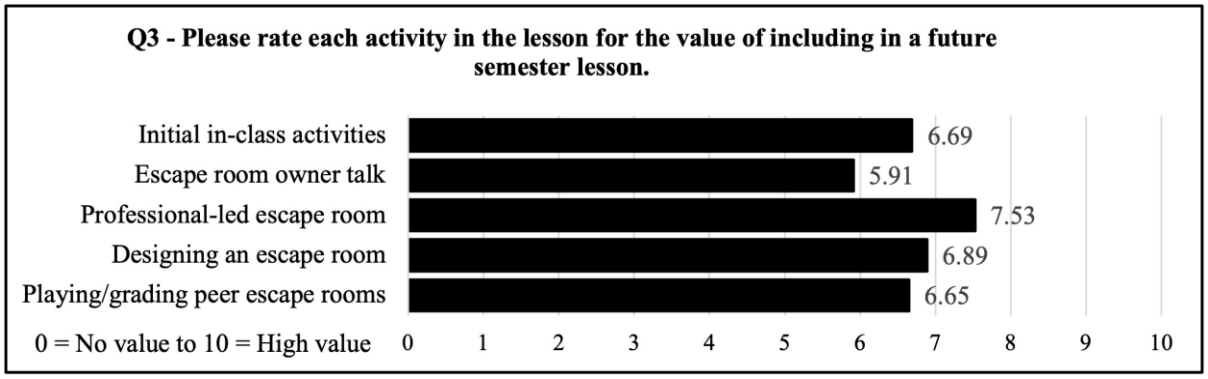
ASSESSMENT RESULTS

Upon completion of the three-week lesson, the professor decided to assess the overall activity for implementation in future semesters. The brief online survey focused on skill development and favorability of including the different activities in the future. The following section highlights the main feedback from the students.

In question three (Q3), students rated five elements of the overall escape room lesson on a sliding scale. The goal of the question was to determine which elements should be used in a future semester or eliminated. Figure 1 shows the mean scores of each which were recorded on a scale from 1-10. One was no value while 10 high value.

The professional-led escape room was the highest ranked part of the lesson. It was done well and the students had fun doing it. The puzzles were challenging, and the facilitators were very engaging, fun and kept the class on-track. As noted earlier, playing games and having fun in the classroom have a positive impact on lessons.

Figure 1: Value of each activity in the scape room lesson

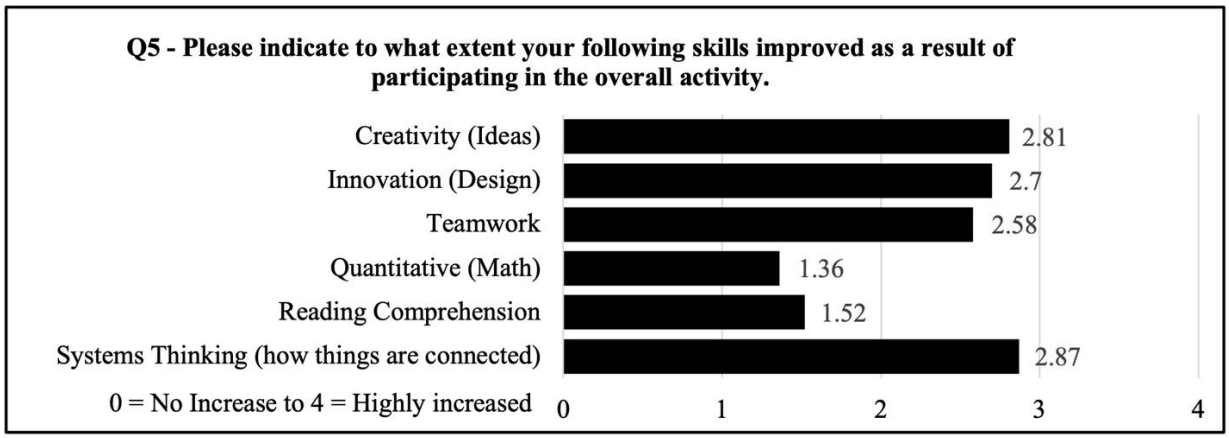


It is interesting to note the lowest mean score of the five was the escape room owner talk. From the professor's point of view, the owner's talk was very beneficial by showing a real-world example of starting an escape room as well as analyzing the impact of COVID-19 on a business. The owner's talk was on an unpleasant snow day so only two people were present in the room while the rest of the class was on Zoom. The video camera used was from a distance making the speaker very small and unable to see facial expressions which may have led to less value to those on Zoom. It is interesting to note the score of the owner value for those students present in class was ranked highest of the five. The speaker did not play a fun game with the class which, possibly leading to lower scores.

Skill Improvement

As referenced in the literature review, escape rooms provide a number of opportunities to enhance skills of students. Since this was conducted in a business-related course, key skills were highlighted which have been identified as essential to business development. The students were asked to self-report the perceived extent of improvement in six areas. It must be noted that the results were reported by the students after the completion of the lesson with no baseline assessment prior to participation. The self-report only refers to perceived impact of the learning opportunities with the escape room activities.

Figure 2: Improvement of skills resulting from the lesson



As a person can see, the skills with the highest means of improvement are those often desired and indicated of high value in business organizations as well as personal development. The goal of the lesson, as well as the course, was to improve creativity and innovation. Both ranked in the top three with fairly high scores of perceived improvement.

Other Results

Similar to the pre-survey, the following post-lesson survey questions were analyzed and categorized by qualitative software.

Q6: What recommendations would you suggest to make the overall escape room activity better?

The overarching Q6 themes reported by the students (N = 33):

- Smaller groups (30%)
- Clearer instructions (21%)
- More examples (15%)
- In-person (12%)
- More time (12%)
- Encourage participation (9%)

To summarize question six (Q6), this particular survey item had a large amount of variability in responses among the participants. However, a relatively large percentage of students stated that smaller groups would have been preferred in the escape room activity. Of these respondents, most site difficulty with coordinating others schedules to meet, as well as getting through all of the presentations. A similar question (Q4), directly asked this question and 51% indicated that four group members was the right amount. Six members came in at 24 percent and five members at 23 percent.

In addition, many students felt that clearer instructions would have aided in their understanding of the project design as a whole. In a similar vein, providing more examples of what online escape rooms look like and providing direction based on these examples was hinted at a few times. While fully realizing that COVID restricted their specific activity, many students felt that an in-person escape room activity would have been better. Finally, students requested more time be given to their teams to complete the project due to its complexity. In addition, many explained how some group members would not participate fully in the design phase or reviewing of other groups projects. For this reason, students requested that the professor encourage more participation from each student.

Q7: After participation in the escape room lesson, what did you learn in relationship to creativity and innovation?

The overarching Q7 themes reported by the students (N=29):

- Creative Thinking (31%)
- Systematic Thinking (28%)
- Diversity of Thought (24%)
- Application (17%)
- Teamwork (14%)
- Technical Skills (14%)

The following is a summary of question seven (Q7) comments. Similar to the preceding question, there was a wide variety for responses to this survey item. Many students felt that they learned valuables skills in both creative thinking and systematic thinking. These students described having to "think outside the box" quite often during the project, something many had not done to this extent before. Combined with systematic thinking, many students for the first time took a creative approach to a project and had to apply their own structure and plan in order to create a successful project. Some participants cited a renewed appreciation for diversity of thought, exclaiming that some of the solutions and procedures implemented in their projects would not have been as good if their teammates had not given their opinion. Many believe that this appreciation was crucial for such as creatively focused project. In addition, some students believed they had acquired skills that could be transferable and applied to other tasks outside of the project setting. Finally, an increased valuation for teamwork and technical skills were learned throughout the project as well.

Selected student quotes from Q7:

- The escape room was a good practice for my creativity and innovation skills. I practiced outside the box thinking and problem solving
- I learned how to work google forms more as well as thinking outside of the box and trying to make people stumped or confused for a moment

- I learned to look for more patterns and look at the questions in multiple ways
- That multiple ideas and strategies comes from everyone else but some more than others
- It just showed how to put creativity into action. It was very interesting to see how each group had a different approach while we all had the same goal of an escape room
- I've learned through collaborative effort, we managed to come up with a creatively interesting murder mystery
- Creativity & Innovation can be implemented in more ways and in more settings than I originally thought

Inclusion in future course
The final question (Q8) asked if the lesson should be included in a future course. The 5-point Likert scale produced an 87% favorability score supporting inclusion of the lesson in a future course.

DISCUSSION

The rise of the use and research of educational escape rooms (EER) has significantly increased since 2017. There is a broad spectrum of how EERs have been used in higher education in terms of content, format, and discipline. However, the publication of business-related EERs is very limited despite the value to organizations in developing soft skills.

This paper described a multi-pronged approach using the concept of escape rooms in a creativity and innovation course in a business college. Students were engaged in learning about escape rooms, hearing from an escape room owner, playing a professional escape room, and then designing escape rooms in small groups. It should be noted that in a post-survey question, the students suggested the size of the groups (seven students) was too large and noted four would have been a better number. In addition, the students indicated better instructions and more examples would have been helpful. COVID restrictions may have played into these factors and students comments also indicated it would have been better in person.

Prior to the activities, the students saw escape rooms as more of a game/puzzle with fun while being engaging and working together as a team – as they probably had not thought about using it in a class to learn other skills. Afterwards, the key findings in the post-survey indicated the students self-reported an increase of the key business skills of critical thinking, creativity, and innovation. Teamwork also ranked high. These findings are similar to research in other EER disciplines as well.

As a result of examining the EER literature, however, it is recognized there needs to be more research done on business-related EERs. Organizations are looking to hire graduates with many of the soft skills that can be developed through successful implementation of EERs. Thus, future research and implementation of business-related EERs will benefit, students, educators, and companies.

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Online Student Perceptions of Effective Course Activities: A Longitudinal Study

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ABSTRACT

Two surveys of the business student population perceptions of online students at an AACSB Jesuit, Catholic University were conducted 6 years apart. At this University, results generally indicated that for this population, student preferences for activities for online did not change over time. However, the list of activities that the students found effective for learning was a very short list. Results have implications for instructors and administrators.

Keywords: Student Perceptual Changes, Online

LITERATURE REVIEW

Administrators perceive online education to be equivalent to Face-to-Face (FTF) (Allen & Seamen, 2013). If this is true, then the present shift in institutions of higher education to completely online or at a minimum hybrid delivery models should not greatly impact students' perceptions of the course activities that help them learn. While there is evidence from prior research on student perceptions that students preferred FTF education over online education, in this current environment, a shift to online occurred (Fish & Snodgrass, 2014). It is important to understand the course activities that students find to be effective as they try to learn in this new environment. It is also important to determine whether or not those perceptions change given that there is reason to believe students do not universally embrace the shift to online learning. The literature on students' perceptions present a mixed picture. Some researchers found similar results to ours (Platt, Raile & Yu, 2014). Several researchers indicated that student perceptions to online education have changed over time (e.g. Allen & Seaman, 2013; Benbunan-Fich & Hiltz, 2003; Fish & Snodgrass, 2019, 2020a, 2020b; Perreault, Waldman, Alexander & Zhao, 2008; Tanner, Noser, and Langford, 2003; Tanner, Noser, Fuselier & Totaro, 2004-1; 2004-2; Tanner, Noser, Totaro & Birch, 2006; Tanner et al., 2009). Chinese students' motivation and learning strategies changed after an online collaborative experience towards a social-constructivist learning approach (Zhu et al., 2009). A recent study on instructor attitudes with respect to instructor online presence noted that studies into instructor and student perceptions will continue to evolve as technology evolves (Richardson, Besser, Koehler, Lim. & Strait, 2016). Our original literature review highlighted two streams of literature: studies concentrating on students' characteristics and studies concentrating on program characteristics (Fish & Snodgrass, 2014). In this portion of our research, we explore changes in students' perceptions regarding course activities. With technology changes at the University, *have the students' perceptions changed as to which activities increase or decrease their understanding?*

Theoretically, the more someone is exposed to and uses a particular technology or method, the more adept they become (Tanner et al., 2003; Tekinarslan, 2011; Dobbs et al., 2009). Our original study indicated that students' acceptance of online education may increase as the number of courses that they take increases (Fish & Snodgrass, 2014). In a study performed over a decade ago, students' perceptions changed as course activities were satisfied (Mortagy & Boghikian-Whitby, 2010). As students acquire more online experience, their perception of online courses is more favorable (Tanner et al., 2003). One researcher found that at least 5 online courses are necessary for students to perceive that they learn more in the online environment than FTF (Dobbs et al., 2009). Over time, graduates grew to accept online education as being equal to or better than traditional FTF education (Perrault et al., 2008).

Originally, students were surveyed in the fall 2012. Since then online courses have increased in number at the University, and instructor methods to teach online and available technologies have changed. Changes include a change from Angel to Desire2Learn, from face-to-face interaction through 'GoToMeeting' to Zoom, the increase in use of YouTube, Google, and other videos, and additional access to database management systems such as Python and 'R'. Decisions regarding the delivery of an online and FTF course activities impact upon student perceptions. Barriers to distance education include: faculty, organization and course structure; physical distance; difficulties in dealing with media; time constraints; lack of background knowledge, distance education experience or technology skills; and low interactivity with the communication process (Olesova, Yang & Richardson, 2011).

Students perceive the course organization as key to student learning and success – particularly the learning environment structure and assessment (Armstrong, 2011). Course design and setup influence student satisfaction (Despr es-Bedward, Avery & Phirangee, 2018). In the online environment, ambiguous instructions contribute to student distress (Perreault et al., 2008) as students want concise, specific directions on everything (Armstrong, 2011). Validated online frameworks with benchmarks and a student-centered model are favored in online education (Mortagy & Boghikian-Whitby, 2010). Flexibility and convenience are often cited by students as relevant factors for choosing an online course (Fish & Snodgrass, 2014; Horspool & Lange, 2012; Perreault et al., 2008). The ease of using a learning management system may affect performance in the course (Lee & Lee, 2008), course retention (Chiu, Hsu, Sun, Lin & Sun, 2005; Levy, 2007) and course satisfaction (Chang & Tung, 2008; Shee & Wang, 2008). Clarity and a coherent structure of the learning contents need to be regarded as an advantage of online materials (Paechter & Maier, 2010).

Technology can assist in connecting to other disciplines and to real-world situations due to the ease and flexibility of dynamic, meaningful representations (Stankous & Buibas, 2018). Critical roles in mediating the use of technological tools must be led by the instructor and the curriculum (Stankous & Buibas, 2018). Instructional software assists in delivering instruction on a topic by allowing learners to: work on problems and receive feedback; act as a tutor to provide information to assist in mastery; model real or imaginary systems as a demonstration of underlying concepts; and increasing motivation through drill or simulation (Roblyer and Doering, 2013). Successful technology integration involves three key principles: (1) students actively playing a role in their learning and receiving personal, frequent feedback; (2) students critically analyzing and creating messages; and (3) teachers connecting in-class activities to the outside world (Stankous & Buibas, 2018). Multiple websites exist today to assist in online education, such as Khan Academy, Wolfram Alpha, Google, and YouTube. While upper division mathematics students appreciated resources, such as myMathLab or WebAssign, to increasing their understanding and performance on tests; general education students preferred a hard copy textbook or had not experience online quantitative software (Stankous & Buibas, 2018).

Online offers greater access to additional learning resources (Sener & Stover, 2000), however, it requires additional student and instructor skills (Tekinarslan, 2011). Technically, online students appear technically well-equipped and comfortable in taking online courses as few students report significant communication issues (Hospool & Lange, 2012). Students preferred written online communication when information is disseminated among students, while FTF communication was preferred in situations in which the interaction goes beyond the mere dissemination of information as in developing a joint solution (Paechter & Maier, 2010). Students perceive a tool's value by how it's implemented, and the negative technology attributes are not as important as the communication quality (Armstrong, 2011). Unfortunately, faculty weak in technology appear to utilize technology in a manner that creates confusion (Armstrong, 2011). Students utilize non-academic resources, such as Google, more readily due to familiarity than academic resources (which they consider to be cumbersome and difficult to navigate) in completing assignments (Armstrong, 2011). Most used and valued elements include accessing unit information, accessing lecture/lab notes, interacting with unit learning resources, reading online discussions, contacting lecturers/tutors and submitting assignments online (Palmer & Holt, 2010). Students indicate that receiving feedback on assignments and reviewing unit progress as needing attention by the instructional provider (Palmer & Holt, 2010). Students perceived video modules, quizzes and the textbook as valuable to the learning environment regardless of online or FTF (Horspool & Lange, 2012). Instant messaging may be used as a technique to increase dialogue and reduce distance between students in an online course (Wang & Morgan, 2008).

In our original study, online students preferred discussion boards, homework and videos to increase their understanding, and felt that in-class sessions and instructor lectures decreased their understanding of course materials (Fish & Snodgrass, 2014). Essentially, the groups tended to 'self-select' toward the environment that they favored for their learning style. Therefore, we pose the following research questions: *Have student perceptions of the effectiveness of academic activities for learning in the online environment changed over the past 6 years?*

Our literature review of course academic activities is not intended to be a comprehensive literature review, but rather, to highlight the ambiguity that exists in the debate on the perceived effectiveness of online course activities. Studies differ in the audience (e.g. scientific versus social sciences, business versus non-business, and graduate versus undergraduate), size (small, medium, large universities), and method of research (e.g. interview, survey). Several online perception studies were completed at large universities or in a public forum (Tanner et al., 2003; Tanner et al., 2004-1; 2004-2; Tanner et al, 2006; Tanner et al., 2009) or in non-business fields (e.g. Dobbs, Waid,

& delCarmen, 2009; Lanier, 2006; Leasure, Davis & Theivon, 2000; Reilly et al., 2012; Tekinarslan, 2011; Wang & Morgan, 2008). Thus, the study's context may be an important factor to consider. Most business student perceptions research was published over 10 years ago (e.g. Perreault et al., 2008; Tanner et al., 2003; Tanner et al., 2004-1, 2004-2), and similar to other studies (Mortagy & Boghikian-Whitby, 2010; Perreault et al., 2008), with changes in technologies, perceptions may have changed. In the present COVID-19 environment, many students have switched to an online learning model that they might not have chosen in normal circumstances.

We conducted our study at a mid-sized, Jesuit, Catholic, business school with a focus on teaching. Class sizes average 17 students. Online education is a growing educational method; however, at the time of the survey not all students had experienced this medium (Allen & Seaman, 2013). Based upon the literature, the research intent of this paper is to explore the changes in graduate and undergraduate business students' perceptions of course activities for those with and without online experience at a teaching university since the original study in 2012 and prior to the COVID-19 pandemic.

RESEARCH METHODOLOGY

At an AACSB accredited, Jesuit, Catholic University in the northeast, undergraduate and graduate business students completed the online Qualtrics-administered survey. The surveys were administered during the month of November 2018, and student participation was completely voluntary. The survey link was sent to business students via a list serve twice over the month. 74 undergraduates and 60 graduates participated in the 2018 survey. A similar survey was administered directly in class to students in FTF classes in fall of 2012, and 64 undergraduate and 47 graduates participated (Fish & Snodgrass, 2014).

Based upon research, we designed the survey to test student perceptions of the effectiveness of course activities to their learning online. Students were also asked, "In the online environment, I feel these activities increase (or decrease) my understanding of the course material." The selection of activities included additional readings, assignments/homework, course surveys, discussion boards, in-class sessions, instructor chat, instructor (live or taped) lectures, instructor office hours, instructor posted notes, laboratory/ experiential activities, other students, problem hints & scaffolding examples, textbook, video of relevant course, material, or 'other'. In the original 2012 study, background information gathered included class level, gender and online experience. In the 2018 study, background information included class level (undergraduate or graduate), age, gender, major (undergraduate) or concentration (graduate), self-described level of technological understanding, and whether the student was a transfer student. Information from the surveys was codified as Significantly Less (1), Less (2), The Same (3), More (4) and Significantly More (5), and the data was entered into an SPSS for analysis.

ANALYSIS

As shown in Table 1, the number of students who have taken at least one online course virtually doubled from 44 (2012) to 82 (2018). The number of students who reported never taking an online course in 2012 (67) decreased slightly by 2018 (52).

Table 1: Number of Students Online in 2012 & 2018 Surveys

# of Students	Online
2012	44
2018	82
Total	126

With respect to the actual number of responses as shown in Table 2, in 2012 the online students indicated 158 activities increased their understanding and 57 decreased their understanding, (Fish & Snodgrass, 2014). For online students, the top three most selected activities to increase their understanding were assignments/homework (20.25%), discussion boards (18.99%), and videos (13.29%), and the top three most selected activities to decrease their understanding were instructor lectures (17.54%), in-class sessions (17.54%), and other students (14.24%). A as one would expect, activities that online students tend to feel increase their understanding are opposite those activities that tend to decrease their understanding. Interestingly, additional readings was the next most selected activity to both increase and decrease the online student's understanding.

Table 2: 2012 Number of Responses and Percentages for Online Student Preference For Activities: "In the online environment, I feel these activities _____ my understanding of the course material." (Fish & Snodgrass, 2014)

Activity	Online			
	Increase		Decrease	
	Total # Responses	% of Total Responses	Total # Responses	% of Total Responses
Additional Reading (not including textbook)	19	12.03	8	14.04
Assignments/Homework	32	20.25	4	7.02
Course Surveys				
Discussion boards	30	18.99	3	5.26
In-class sessions (live sessions that are not lectures)	7	4.43	10	17.54
Instructor chat	14	8.86	4	7.02
Instructor (live or taped) lectures	12	7.59	10	17.54
Instructor Office Hours				
Instructor Posted Notes				
Laboratory / experiential activities				
Other students	15	9.49	9	15.79
Problem Hints & Scaffolding Examples	8	5.06	6	10.53
Textbook				
Videos of Relevant Course Material (not instructor-lead)	21	13.29	3	5.26
Other				
Total	158	100.0	57	100.0

In addition to the 2012 list of activities, the 2018 survey included course surveys, instructor office hours, instructor posted notes, laboratory/experiential activities, textbook and 'other'. In 2018 as shown in Table 3, the number of online student responses for increasing their understanding indicated 428 activities and 92 activities decreased their understanding. In 2018, online students felt that assignments/homework (15.65%), discussion boards (11.92%) and videos (10.98%) were the key activities that increased their understanding, which was the same set of activities as 2012 online students. As for activities that decreased their understanding, the key activities that online students indicated in 2018 were additional readings (11.96%), other students (10.87%), textbook (10.87%), discussion boards (9.78%) and in-class sessions (9.78%). As expected, the activities that online students favor as increasing tend to be the opposite of those that they feel decrease their understanding. Textbooks were viewed negatively. Oddly, online students viewed discussion boards as both increasing and decreasing their understanding. Online students in 2018 viewed additional readings, discussion boards and textbooks negatively.

Table 3: 2018 Number of Responses and Percentages for Online Student Preference For Activities: "In the online environment, I feel these activities _____ my understanding of the course material." (Fish & Snodgrass, 2019)

Activity	Online			
	Increase		Decrease	
	Total # Responses	% of Total Responses	Total # Responses	% of Total Responses
Additional Reading (not including textbook)	38	8.88	11	11.96
Assignments/Homework	67	15.65	3	3.26
Course Surveys	13	3.04	6	6.52
Discussion boards	51	11.92	9	9.78
In-class sessions (live sessions that are not lectures)	13	3.04	9	9.78
Instructor chat	30	7.01	3	3.26
Instructor (live or taped) lectures	33	7.71	6	6.52
Instructor Office Hours	21	4.91	3	3.26
Instructor Posted Notes	35	8.18	3	3.26
Laboratory / experiential activities	6	1.40	6	6.52
Other students	21	4.91	10	10.87
Problem Hints & Scaffolding Examples	19	4.44	2	2.17
Textbook	34	7.94	10	10.87
Videos of Relevant Course Material (not instructor-lead)	47	10.98	6	6.52
Other	0	0.00	5	5.43
Total	428	100.00	92	100.00

As shown in Table 4, the percentages of students selecting a particular activity changed over the six years. Online students in 2012 and 2018 indicated the same top three activities increased their understanding (assignments/homework, discussion boards and videos), and both groups felt in-class sessions and additional readings decreased their understanding. Respectable changes in percentage of decreasing activites over the six-years exists for online students with respect to in-class sessions (dropped 7.76%), instructor lectures (dropped 11.02%) and problem hints & scaffolding examples (dropped 8.36%).

Table 4: Online and FTF Student Preference For Activities: "In the online environment, I feel these activities _____ my understanding of the course material."

Activity	2012 % of Students		2018 % of Students		Change in % 2018 -2012	
	Online Students		Online Students		Online Students	
	Increase	Decrease	Increase	Decrease	Increase	Decrease
Additional Readings (not including textbook)	12.03	14.04	8.88	11.96	-3.15	-2.08
Assignments/ Homework	20.25	7.02	15.65	3.26	-4.6	-3.76
Course Surveys			3.04	6.52		
Discussion boards	18.99	5.26	11.92	9.78	-7.07	4.52
In-class sessions (live sessions that are not lectures)	4.43	17.54	3.04	9.78	-1.39	-7.76
Instructor chat	8.86	7.02	7.01	3.26	-1.85	-3.76
Instructor (live or taped) lectures	7.59	17.54	7.71	6.52	0.12	-11.02
Instructor Office Hours			4.91	3.26		
Instructor Posted Notes			8.18	3.26		
Laboratory / experiential activities			1.40	6.52		
Other students	9.49	15.79	4.91	10.87	-4.58	-4.92
Problem Hints & Scaffolding Examples	5.06	10.53	4.44	2.17	-0.62	-8.36
Textbook			7.94	10.87		
Videos of Relevant Course Material (not instructor-lead)	13.29	5.26	10.98	6.52	-2.31	1.26
Other			0.00	5.43		

While the top activities for online generally remained the same, activities that students preferred over the six years, significant changes occurred as noted in Table 5. (Statistically, since we measured the proportion of an activity being favored or not favored by students, then if students feel the same between years, then the difference between the proportion would be zero. Statistically, using a normal test with two-tails and different sample sizes, the null hypothesis is H_0: p1 = p2, and the alternative hypothesis is H_1: p1 ≠ p2.) Table 5 contains a wealth of information regarding statistical comparisons as to whether students felt the activity increased or decreased their understanding for the two years (2012 and 2018) and two educational methods (OL and FTF). For example, we continue with an indepth explanation for the first row of the table, that is, additional readings. The first and second comparisons are within each year, and compare the differences between OL and FTF perspectives. In 2012, the percentage of students OL versus the percentage of FTF students indicating that additional readings increased their understanding was insignificant (p=.1451), while the percentage of students indicating that OL versus the percentage of FTF students indicating that additional readings decreased their understanding was also insignificant (p=.8823). In 2018, the percentage of OL students versus the percentage of FTF students who felt that additional readings increased their understanding remained insignificant (p=.2817), and similarly, the percentage of students OL versus the percentage of students FTF who felt that additional readings decreased their understanding remained insignificant (p=.9937).

We continued our analysis by comparing the two years for each educational method. Continuing with our example of additional readings, the statistical difference for OL students between 2012 and 2018 who indicated that additional readings increased their understanding was insignificant (p=.2535), and similarly the statistical difference for OL students between 2012 and 2018 who indicated that additional readings decreased their understanding was also insignificant (p=.7392). As for the FTF students, the statistical difference for FTF students between 2012 and 2018 who indicated that the additional readings increased their understanding was insignificant (p=.5286), and similarly, the statistical difference for FTF students between 2012 and 2018 who indicated that the additional reading decreased their understanding was insignificant (p=.5696). For online students, significant differences that occurred between 2012 and 2018 for online student preferences for activities that increase their understanding include discussion boards (p=.0278) and other students (p=.0405), while activities that decrease their understanding include problem hints & scaffolding examples (p=.0477) and a slight significance for instructor lectures (p=.0574).

Table 5: Statistical Differences between Online and FTF Student Preferences for Activities: "In the _____ environment, I feel these activities ____ my understanding of the course material."

Activity	2012 OLv FTF		2018 OL v FTF		OL 2012 v 2018		FTF 2012 v 2018	
	Increase	Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease
Additional Readings (not including textbook)	0.1451	0.8823	0.2817	0.9937	0.2535	0.7392	0.5286	0.5696
Assignments/ Homework	0.03*	0.7743	0.9011	0.7983	0.1872	0.3428	0.2644	0.244
Course Surveys			0.1663	0.969				
Discussion boards	0.3379	0.1405	0*	0.333	0.0278*	0.3751	0*	0.6489
In-class sessions (live sessions that are not lectures)	0.0013*	0.9174	0*	0.0654	0.411	0.2142	0.7842	0.0013*
Instructor chat	0.1159	0.2782	0.9693	0.7983	0.4508	0.3428	0.0171	0.0478
Instructor (live or taped) lectures	0.0152*	0.2766	0.221	0.218	0.9614	0.0574	0.0002*	0.9276
Instructor Office Hours			0.0573**	0.417				
Instructor Posted Notes			0.2295	0.1**				
Laboratory / experiential activities			0.1509	0.969				
Other students	0.1969	0.3395	0.0001*	0.0035*	0.0405*	0.431	0.9358	0.0036*
Problem Hints & Scaffolding Examples	0.0004*	0.0019*	0.2563	0.8335	0.7507	0.0477*	0*	0.3083
Textbook			0.4986	0.9669				
Videos of Relevant Course Material (not instructor-lead)	0.0237	0.2329	0.0019*	0.7471	0.4384	0.7776	0.1263	0.1908
Other				0.1564				

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

CONCLUSIONS

Due to COVID-19, virtually all universities in the United States have shifted to online education. In the online environment, while the course is organized and created by the instructor, online students tend to prefer information transfer by themselves through assignments/homework, discussion boards, videos and additional readings (which are not instructor led). The preferred list of activities corresponded with another study conducted in 2010 that indicated that online discussions and assignments were positively viewed by online students (Palmer & Holt, 2010). However, in contrast to a 2012 study where online students favored the textbook (Horspool & Lange, 2012), online students in this study perceived the textbook negatively.

With respect to changes over the six years, online students still favored the same activities as increasing their understanding in 2018 as in 2012. Instructor lectures were not as negatively viewed as in 2012. Changes in student perspective for activities were noted for the online students. 2018 online students did not feel that other students and discussion boards increased their understanding as much as 2012 students. However, 2018 online students did not regard problem hints & scaffolding as negatively as in 2012. Current online students perceive assignments/homework positively in contrast to a 2010 study (Palmer & Holt, 2010) where students indicated that these decreased their understanding. Our study noted a statistical shift for some, but not all activities, over the six years of study. As technology changes, students perceptions may change as other researchers noted with respect to

various factors (e.g. Allen & Seaman, 2013; Benbunan-Fich & Hiltz, 2003; Fish & Snodgrass, 2019, 2020a, 2020b; Perreault, Waldman, Alexander & Zhao, 2008; Tanner, Noser, and Langford, 2003; Tanner, Noser, Fuselier & Totaro, 2004-1; 2004-2; Tanner, Noser, Totaro & Birch, 2006; Tanner et al., 2009). A change in perceptions on course activities for this group of students at this particular University was not noted. As more students were forced to go online due to COVID-19, it will be interesting to see if this population changes its perspectives on course activities in the future.

The context of the study may be a critical factor to consider in understanding student activity preferences. For the program factors surveyed at this teaching University, online students regard less personal interaction activities more positively. Other University students may value these activities differently as noted in other studies.

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A Preliminary Study of Age and Gender and Their Influence on Student Perspectives of Online versus Face-to-Face Education at a Jesuit Institution

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ABSTRACT

As technology continues to evolve, insight into student perspectives of online versus face-to-face education is important to improving student understanding and motivation. Over time peoples' perspectives change. The purpose of this phase is to study how age and gender affect business student perceptions of online education.

Keywords: student perspectives, online education, face-to-face, age, gender

INTRODUCTION

Over the past nine years, we conducted two surveys of the business school population to uncover student perspectives on online and face-to-face (FTF) education. Our University is a mid-sized, Jesuit, Catholic, private school with a focus on teaching traditional arts and sciences, education and business. FTF class sizes average 17 students. Our survey includes two streams of research: questions on individual student factors (motivation, discipline, self-directed, independence, schedule flexibility, time and cost investment, happiness, and appropriateness of online), and questions that address program factors (difficulty, preference, cheating, interaction between students, and interaction between the instructor and student). The initial survey revealed that students who had experienced and those who had never experienced an online class both overwhelmingly perceived FTF classes more positively than online classes for all individual and program factors (Fish & Snodgrass, 2014). Since that time, the number of courses offered at the University increased; however, not all students had taken an online course prior to the pandemic. With the pandemic, the University migrated all courses to online education. While the pre-pandemic survey results do not speak to *all* students perceptions regarding online versus face-to-face education, students that experienced online education prior to the pandemic still represent the population of online student perspectives of online versus face-to-face education.

In recent years, we re-surveyed the business students and found that some perspectives had significantly changed (Fish & Snodgrass, 2020a, 2020b). With respect to individual factors, significant changes in student perspectives for students who had experienced online education occurred for self-directed, time investment and appropriateness of education. By our recent survey, online students felt that online education was acceptable – a change from the original posture online students took. With respect to students who never took an online class (the FTF group), few significant differences over the time period occurred as only the self-directed factor significantly differed between the two survey time periods (Fish & Snodgrass, 2020b). With respect to program factors, students who experienced online courses did not change their perspectives on program factors over the time period. However, recent FTF students were more indifferent to the teaching environment than FTF students of the past and recent FTF students were not as positive about the interaction with the instructor (Fish & Snodgrass, 2020a). In general, we detected a few 'shifts' in perspectives regarding online and FTF education. We continue our discussion here by exploring age and gender differences. *Are student perspectives of online versus face-to-face education affected by age or gender?*

LITERATURE REVIEW

As the number of online courses and programs in the higher education system (Allen & Seamen, 2013) increases, there is a need to continue to assess both the student's and instructor's perspectives on online education (Shieh, Gummer & Niess, 2008). Student perspectives are an important part of the educational experience. As technology and instructional delivery methods evolve, online education – and students' perspectives - will change as well. Researchers have explored student perceptual differences between online and FTF education by demographic factors – and the results often differ (Billings, Skiba & Connors, 2005; Dobbs, Waid, & del Carmen. 2009; Tanner, Noser, Fuselier, & Totaro., 2004a; Tanner, Noser, Fuselier, & Totaro 2004b; Fish & Snodgrass, 2014; Fish & Snodgrass, 2015; Fish & Snodgrass, 2016a; Fish & Snodgrass, 2016b). Results may also change over time. In a recent study, student perspectives changed on some – but not all factors (Fish & Snodgrass, 2020a, 2020b). This paper seeks to present student perspectives based upon age and gender.

With respect to age, results vary. One research stream demonstrates that age does not impact upon student perspectives (Tanner, Noser & Langford, 2003), while another research stream indicates that age has a positive impact upon students' perspectives of online learning (Tanner et al., 2004-1; 2004-2). While one study found that adult students (21 and older) perceived online education more favorably than younger students (Tanner et al., 2003), another study found that younger students (regardless of their culture) appeared to be more technologically savvy (Lee, Becker & Nobre., 2012). Many of the studies on student perspectives are over a decade old, when technological capabilities of delivering educational materials online was very different. *How do today's students feel about online education? Are younger – or older – students more favorable to online education?*

Gender issues may affect online learning. Group composition, the degree of participation and elaboration may differ by gender (Prinsen et al., 2007). (Men may use fewer words, less elaboration, explain more and express disagreement more than women, and women are more likely to initiate conversation with questions and requests for information.) With respect to differences in perspectives by gender, research results also differ. Some studies indicate that gender does not play a factor in student perceptions for undergraduate students (Tanner et al., 2003; Chawla & Joshi, 2012; Fish & Snodgrass, 2015), while others indicate a difference (Tanner et al., 2004-1; 2004-2; Chaturvedi, & Dhar; 2009). In one study, women displayed a more positive attitude than men towards web-based learning (Chen & Tsai, 2007). However, another study suggests that males are significantly more comfortable with computers (Kay, 2009) and internet competencies are higher for males than females (Tekinarslan, 2011). Yet another study found that women experience a richer, more valuable presence in online learning and are more satisfied than males (Ashong & Commander, 2012; Johnson, 2011). Another researcher reported no gender differences in computer self-efficacy (Tekinarslan, 2011). Other researchers found that women perceived online course effectiveness higher than males particularly on program factors (Seok et al., 2010; Chang et al., 2014).

Cultural differences between men and women with respect to education exist. For example, comparing African-American perceptions to other American perceptions, men's perspectives are significantly different than women's as men view instructor assistance, friendliness, trust and interest in students, student interaction, and collaboration more negatively than their female counterparts (Ashong & Commander, 2012). Gender issues are still extremely relevant in societies that continue to separate men and women in the FTF - and online - classrooms, such as in Saudi Arabia (Hamdan, 2014). In general, regardless of culture, men tend to be more individualistic, while women tend to be collectivistic (Tsaw et al., 2011). (Individualistic people focus on their own personal goals and tend to be raised in Western cultures, while collectivistic people tend to focus on the group goals and be raised in Eastern cultures.)

With respect to our previous research, men and women did not differ significantly in their perspectives (Fish & Snodgrass, 2015). Since many of the studies cited here are over a decade old, and since similar research on student perceptions noted changes in student perceptions over time (Fish & Snodgrass, 2016a, 2016b, 2020a, 2020b), perhaps men and women's perspectives on online and FTF education have changed over time. *Do today's men and women students differ in their perspectives of online and FTF education?*

STATEMENT OF THE PROBLEM

Prior to COVID-19, online education was a growing educational method (Allen & Seaman, 2013) whereby students could 'self-select' to take online courses and programs. In light of the pandemic, every enrolled student –whether they chose to or not – must take online courses. Whether higher educational institutions resort back to traditional FTF education – or remain with online education - following the pandemic remains unanswered. In order to meet student expectations following the pandemic, institutions must include student perceptions in their decision-making on this topic. Our research highlighted the changes that appear to be occurring in the population on this topic for a few factors (Fish & Snodgrass, 2020a, 2020b). Based upon the literature review, we continue this discussion as we address age and gender differences. The specific research questions include: *Are there differences between 'older' and 'younger' students in their perspectives for online versus FTF education? Are there differences between men and women's perspectives?* Theoretically, students should perceive the online and FTF environments equally and not favor either online or FTF education regardless of their gender or age, which leads to the following hypotheses:

Age.
Ho1: Older and younger students (who have taken an online course) do not differ in their perspectives of online education.
H11: Older and younger students (who have taken an online course) differ in their perspectives of online education.

Gender.
Ho2: Men and women students (who have taken an online course) do not differ in their perspectives of online education.
H12: Men and women students (who have taken an online course) differ in their perspectives of online education.

METHOD

At an AACSB accredited, Jesuit, Catholic University in the northeast, undergraduate and graduate business students completed an online Qualtrics-administered survey in 2012 and 2018. University Internal Review Board and Academic Vice President approval for distribution was granted for both surveys. Student participation was completed voluntary. Twice over the month of November, students received the survey link via a list serve.

The instructors previously designed a survey to test student perceptions of difficulty, motivation, student-to-student interaction, student-to-instructor interaction, discipline, cheating, self-directed, independence, schedule flexibility, time investment, cost investment, preference for online or FTF environments, happiness with online or FTF education, and appropriateness of online at the University (Access at http://www.cambriainstitute.com/journals/j.brcacadjb.2015.04.01.wa04.pdf.). Students were also questioned as to which activities decreased or increased the understanding of course material. The selection of activities included additional readings, assignments/homework, course surveys, discussion boards, in-class sessions, instructor chat, instructor (live or taped) lectures, instructor office hours, instructor posted notes, laboratory/ experiential activities, other students, problem hints & scaffolding examples, textbook, video of relevant course, material, or 'other'. In the original 2012 study, background information gathered included class level (undergraduate or graduate), gender and online experience. Important to this study was the fact that in the 2012 survey a question as to participant age was not asked. In the 2018 study, background information included class level (undergraduate – freshmen, sophomore, junior, senior or graduate), age, gender, major (undergraduate) or concentration (graduate), self-described level of technological understanding, and whether the student was a transfer student.

The survey was divided into 2 sections: Section A and Section B. Section A ("online") was completed by students who experienced at least 1 online course, while Section B of the survey ("Traditional FTF) was completed by students who never took an online course. While sections A and B had corresponding questions, Section A statements were specific to "I found" versus Section B statements were "I perceive". The last three questions asked students if they would prefer the opposite environment, their emotional happiness with the learning environment, and whether online courses were appropriate for the institution. For students with online experience, the last question inquired why they chose to take an online course. Given the pandemic, the discussion will only highlight the online perspectives (Section A). Information from the surveys was codified as Significantly Less (1), Less (2), The Same (3), More (4) and Significantly More (5), and the data was entered into an SPSS for analysis. For example, if an online student felt that online was more difficult than FTF, he or she would indicate a 'significant positive' for the online environment through scoring it as a '5'.

ANALYSIS

Given the survey setup and previously discussed significant differences between the online and FTF student perspectives, as well as today's educational environment whereby all students take courses only the results from the online student perspectives are presented. We performed Chi-Square analysis using the contingency coefficient as the nominal value using SPSS.

Age. Since the original 2012 survey did not ask participants for their age, our analysis included only the 2018 survey. Students were not required to answer every question; however, 77 students answered the 'age' demographic question and completed the online perspectives section. Table 1 outlines the distribution of age for the online students.

As shown in Table 2, self-directed (p=.013), independence (p=.000), schedule flexibility (p=.001), happiness (p=.000) and appropriateness of online education (p=.001) significantly differed between the different age groups. For these factors, the alternative hypothesis, H11 is supported. As shown in Appendix A, the distributions for each of these factors over age appear to demonstrate that *younger students are more positive to each of these factors than older students.* Specifically, younger students perceive the online environment to be significantly more self-directed and independent (than FTF education) than older students. Younger students perceive online education to offer

significantly more independence and were significantly happier (than FTF education) than older students. Ironically, few older students did not feel online education was appropriate, while more younger students were undecided or felt it was inappropriate.

Table 1. Distribution by Age for Survey Participants

Age	OL Students
18	
19	2
20	13
21	20
22	18
23	4
24	1
25	1
26	1
27	
28	2
29	3
30	1
31	2
32	1
33	
34	2
35	2
36	
37	2
38	
60	2
Total	77

Table 2. Chi-Square Analysis online 2018 by Age

Metric	Pearson Chi-Square Value	Df	Asymptotic Significance (2-sided)	Pearson's R	Spearman Correlation
Difficulty	55.287	48	.219	.175	.138
Motivation	64.058	64	.474	-.117	.038
Student Interaction	54.664	64	.791	-.166	-.178
Instructor Interaction	66.358	64	.396	-.113	-.058
Discipline	52.486	64	.848	.028	.027
Cheat	40.605	48	.767	.137	.136
Self-directed	91.845	64	.013 *	-.211	-.254
Independence	108.048	64	.000 *	-.197	-.201
Schedule flexibility	82.750	48	.001 *	-.077	-.106
Time investment	53.409	64	.825	.051	.239
Cost investment	10.024	48	.787	.179	-.020
Preference	37.112	32	.245	.035	.075
Happiness	113.418	64	.000 *	-.142	-.143
Appropriateness online	61.034	32	.001 *	.042	.036

Gender. While participants were not required to answer every question, results that included students who answered the gender question (for Section A) yielded 41 useable surveys in 2012 and 123 useable surveys in 2018. As shown in Table 3, 24 men and 17 women completed the survey in 2012, and 34 men and 48 women completed the survey in 2018.

As shown in Table 4, for the 2012 online students, a significant difference between men and women exist for difficulty (p=.031). Therefore, with respect to every factor except difficulty, the null hypothesis, H02 is supported.

As shown in Table 5, in 2012, men tend to view online education as significantly easier than FTF than women. Independence (p=.076) and appropriateness (p=.097) are slightly significant. Men tend to enjoy the independence in the online environment more than the FTF environment, while women tend to prefer independence of the FTF environment more than the online environment. As for appropriateness of online, men are more favorable to its appropriateness than women.

Table 3. Number of Students in 2012 & 2018 Surveys

Survey Year	# of Students Online		
	Males	Females	Total
2012	24	17	41
2018	34	48	82
Total	58	65	123

Table 4. Chi-Square Analysis online 2012 by Gender

Metric	Pearson Chi-Square Value	Df	Asymptotic Significance (2-sided)	Pearson's R	Spearman Correlation
Difficulty	8.902	3	.031*	.201	.163
Motivation	1.525	3	.677	-1.02	-.099
Student Interaction	1.374	4	.849	-.121	-.119
Instructor Interaction	3.438	4	.487	-.191	-.196
Discipline	5.662	4	.226	.208	.226
Cheat	2.431	4	.657	-.226	-.207
Self-directed	5.661	4	.226	-.183	-.211
Independence	8.450	4	.076 **	-.237	-.177
Schedule flexibility	2.021	3	.568	-.017	.041
Time investment	1.938	3	.585	.124	.134
Cost investment	.222	2	.895	-.073	-.073
Preference	1.913	2	.384	-.211	-.215
Happiness	6.460	4	.167	-.309	-.251
Appropriateness online	4.671	2	.097 **	.265	.231

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

Table 5. Distribution of online 2012 Student Responses by Gender

Factor	**Gender**	**1**	**2**	**3**	**4**	**5**	Total
Difficulty	Male	6	6	10	2	0	24
	Female	0	9	4	4	0	17
	Total	6	15	14	6	0	41
Independence	Male	0	2	7	11	4	24
	Female	2	5	1	6	3	17
	Total	2	7	8	17	7	41
		1 (Yes)	2 (Undecided)	3 (No)	Total		
Appropriateness	Male	15	7	2	24		
	Female	8	3	6	17		
	Total	23	10	8	41		

By 2018, as shown in Table 6, analysis reveals that significant differences between men and women exist for students in the online group on schedule flexibility (p=.048) and happiness (p=.026). A slightly significant difference also exists for appropriateness of online education (p=.100). Regarding schedule flexibility and happiness, women overwhelmingly favor the online environment, while men are 'favorable' to it. As shown in Table 7, with respect to schedule flexibility, women perceive schedule flexibility online to be significantly more than FTF than men. While men and women both are 'happy' with online education, women tend to be happier with online and felt it was more appropriate than men.

Comparing the 2012 results to the 2018 results shows that while significant differences between online men and women were noted in 2012 for difficulty and in 2018 for schedule flexibility and happiness, these factors were insignificant in the opposite year survey. Student perspectives on these factors may have changed over the 6 years for these factors. In general, for all other factors, men and women had the same perspectives.

Table 6. Chi-Square Analysis online 2018 by Gender

Metric	Pearson Chi-Square Value	Df	Asymptotic Significance (2-sided)	Pearson's R	Spearman Correlation
Difficulty	1.603	3	.659	-.135	-.132
Motivation	4.184	4	.382	.048	.020
Student Interaction	4.390	4	.356	-.002	-.003
Instructor Interaction	4.920	4	.296	.123	.096
Discipline	3.655	4	.455	.104	.075
Cheat	2.594	3	.459	-.042	-.063
Self-directed	3.018	4	.555	.083	.097
Independence	.939	4	.919	-.040	-.027
Schedule flexibility	7.888	3	.048*	.210	.262
Time investment	.903	4	.924	.013	.026
Cost investment	.950	3	.813	.007	.010
Preference	1.745	2	.418	.146	.144
Happiness	11.095	4	.026*	.087	.104
Appropriateness online	4.600	2	.100 **	-.127	-.068

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

Table 7. Distribution of online 2018 Student Responses by Gender

Factor	Gender	1	2	3	4	5	Total
Schedule Flexibility	Male	0	0	6	16	12	34
	Female	1	0	2	16	29	48
	Total	1	0	8	32	41	82
Happiness	Male	0	6	9	12	7	34
	Female	3	0	15	17	13	48
	Total	3	6	24	29	20	82
		1 (Yes)	2 (Undecided)	3 (No)	Total		
Appropriateness	Male	27	4	3	34		
	Female	40	8	0	48		
	Total	67	12	0	82		

DISCUSSION

Prior research on the differences between student perspectives on different individual and program factors demonstrated that online students and FTF students perceived the environments differently on most factors, and both groups tended to favor the FTF environment for the individual factors analyzed (Fish & Snodgrass, 2014). However, recent results showed a shift in student perspectives for a few factors for students who had experienced online education, but little shift in the perspectives of students who did not experience online (Fish & Snodgrass, 2020a, 2020b).

Our results explore the impact of age and gender on business student perspectives at a Jesuit, Catholic University in the Northeast. Our results offer another 'data point' to very mixed results. For our population of study, online students differed by age for some – but not all - of the factors that we studied. Therefore, for some factors our research supports that age does not impact upon student perspective, similar to other researchers (Tanner et al., 2003); however, for other factors, our research supports that age impacts upon student perspectives (Tanner et al., 2004-1; 2004-2). Contrastingly to prior research (Tanner et al., 2003), our research tends to show that for significant factors of self-directed, independence, schedule flexibility, and happiness, younger online students are more positive toward online education than older students. However, older students perceive online education to be more appropriate than their younger counterparts.

In our original study, men and women did not differ on the factors of study (with the exception of the online group differing on difficulty). In 2012, men tend to view online education as significantly easier than FTF than women; however, this difference was not significant 6 years later. By 2018, for the online students, differences between men and women on schedule flexibility and happiness were significant. For both of these factors, women overwhelmingly favor the online environment, while men are 'favorable' to it. While our original research demonstrated no differences between men and women (Fish & Snodgrass, 2015), our current research shows a few significant changes for the online group (similar to prior researchers (Tanner et al., 2004-1; 2004-2; Chaturvedi, & Dhar; 2009)).

In 2012, the number of FTF students who participated in our study significantly outnumbered those who took an online course. Six years later, the number of students who had taken an online course and participated in our study outnumbered those students who had not. While six years have elapsed and additional online courses are available to students, the results show few differences in perspectives. While this is not 'significant', it demonstrates (1) the clear view that this population has on the topic of online education, (2) that men and women in online education do not differ on most factors in their perspectives of online education but these views may be changing, and (3) for students who have experience online courses, younger students may be more favorable to online than their older counterparts. It is important to remember that these results were for a private University whose main focus is teaching and not research. Student perceptual studies tend to show a preference for students toward FTF education over online (Fish & Snodgrass, 2020a; 2020b). Perhaps the setting impacts upon the results, and other studies may reveal different perspectives depending upon the institutional setting. Future research may seek to explore these differences. As the pandemic continues, student perceptions regarding online versus FTF education may continue to change. In order to meet expectations, educators and administrators need to address these changes.

CONCLUSION AND LIMITATIONS

Our study represents an analysis of age and gender affects upon student perspectives of online versus FTF education. For the online population, the results represent a few mixed results as some factors of study for the online students differ by age and gender, but most factors did not. Where there were significant differences, younger online students tended to view online education more favorably than their older counterparts. However, the number of older participants in the study was small, and therefore, these results should be viewed cautiously. As online education continues to grow and students continued to be educated online due to the pandemic, student perspectives may change and future studies should continue to monitor these changes. With studies of perspectives, one should consider the context of the study, in this case, a private, Jesuit University in the northeast United States with a focus on teaching. Other universities students may perceive online versus FTF education differently, and the context of the study may be a critical factor to consider.

Limitations. A key limitation for this study was the sample size – particularly for age comparison where the number of older students was small. While the response rate for the population is adequate, in some cases the analysis for each of the demographic factors studied, subdivided the samples into very small groups. In future studies, a larger population, which could include adequate subgroup sizes (n>30), may reveal significant differences in perspectives.

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Appendix A: Age Distribution for Online Students

Self-directed

Age	1	2	3	4	5	Total
19				1	1	2
20		1	4	6	2	13
21		4	4	5	7	20
22	1	2	4	5	6	18
23		1		2	1	4
24				1		1
25	1					1
26				1		1
28			1	1		2
29			2	1		3
30		1				1
31			1	1		2
32			1			1
34	2					2
35		1	1			2
37			1	1		2
60			1	1		2
Total	4	10	20	26	17	77

Independence

Age	1	2	3	4	5	Total
19				1	1	2
20			2	8	3	13
21		3	3	7	7	20
22		3	4	5	6	18
23				2	2	4
24				1		1
25	1					1
26				1		1
28			1	1		2
29				1	2	3
30				1		1
31				2		2
32			1			1
34	2					2
35			1	1		2
37			1	1		2
60			1	1		2
Total	3	6	14	33	21	77

Schedule Flexibility

Age	1	2	3	4	5	Total
19				1	1	2
20			1	7	5	13
21				6	14	20
22			1	9	8	18
23				1	3	4
24					1	1
25			1			1
26				1	1	1
28			1		2	2

29			1			3
30				1	1	1
31				1	1	2
32						1
34	1			1		2
35				2		2
37				2		2
60					2	2
Total	1		5	32	39	77

Happiness

Age	1	2	3	4	5	Total
19				2		2
20		1	3	6	3	13
21		1	5	7	7	20
22	1	1	6	6	4	18
23			1	2	1	4
24				1		1
25		1				1
26					1	1
28			2			2
29				2	1	3
30		1				1
31					2	2
32			1			1
34	2					2
35			2			2
37				1	1	2
60			1	1		2
Total	3	5	21	28	20	77

Appropriateness of Online Education

Age	1 (Yes)	2 (Undecided)	3 (No)	Total
19	2			2
20	12	1		13
21	15	5		20
22	13	4	1	18
23	4			4
24	1			1
25			1	1
26	1			1
28	2			2
29	3			3
30			1	1
31	2			2
32	1			1
34	2			2
35	2			2
37	2			2
60	1	1		2
Total	63	11	3	77

Online Learning And The New Normal

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ABSTRACT:

Educators have always experienced challenges in performing their responsibilities, and those challenges have become more complex with the advent of COVID-19 and remote learning. While remote learning had increased in importance prior to the current pandemic, its surge in implementation during 2020 has exposed some limitations and issues. Different styles of learning appear to directly impact the effectiveness of online learning. A small exploratory study of 200+ graduate students was undertaken and the results of this study suggesting a number of potential strategies and further areas for research.

Keywords: Online Learning, Human Dynamics, Learning Styles

INTRODUCTION:

DeSantis and Dammann (2020) write that what was previously considered to be 'best practices' in higher education may no longer be appropriate. With the widespread institution of distance learning due to the current pandemic, news reports frequently state that students are not adequately achieving expected educational goals. Further, it is likely that the transition to distance learning may not be a short-term phenomenon for a variety of reasons including the cost of higher education for universities and colleges in a traditional 'brick-and-mortar' environment, the emerging trend of people moving from higher-population density regions to lower-population density regions with the possibility of fewer available educational resources, and the reluctance of students to continue to pay high tuition costs (currently approaching $80,000/year for some select private colleges).

However, to address perceived shortcomings in delivering education through distance-learning technologies, it might be important to investigate if there is any relationship between a student's preferred learning style and predisposition to interacting with the world, and how those learning styles and any relationship might impact the effectiveness of online learning.

Many scholars have suggested that there are differences in learning styles. Hawk and Shah (2007) have noted that students have different preferred styles of learning. These styles of learning are both hereditary (Seagal and Horne, 1997), and 'learned' by individuals as they engage as active members of society. Many other scholars have noted the diversity of learning styles and preferences for humans including Allitt (2010), Antonancopoulou (2006), Antonacopoulou and Chiva (2007), Binsted (1980), Brockbank, McGill, and Beech (2002), Drummond, T. (2016), Brocket, R.G. (2016), Elkhannoubi, H.B. (2016), Honey and Mumford (1992), Islam, A.N. (2013), Irfan, O.M. (2016), Kaufman et.al. ((2010), Kolb, Rubin & MacIntyre (1984), Kolb, D.A. (2014) Macpherson, et.al. (2003), Pashler, H., et.al. (2008), Pasupathi, M. (2012), Perry, et.al. (2010), Rau, H. (2009), Rau, H. (2012), Schaler, J.A. (2006), Truong, H.M. (2015). Further, in support of the work of Brocket (2016) noting that there are one dozen aspects of adult learners that must be considered, are numerous scholars including: Argyris & Schon (1974),Astin (1984), Bolkan & Goodboy (2011), Dewey as noted by Gabelnick et. al. (1990), Frymier & Shulman (1995), Hays (2008), Klem & Connell (2004), Kolb (1984), Linville (2014), Rau, H. (2017), Rodriguez, et.al. (1996), Schon (1983), Turner (1995), and Tyler (1949), Umbach & Wawrzynski (2005).

Four specific learning styles were utilized for this study: reading and studying alone, discussion and debate with classmates in class, group work in class and outside of the class, and lecture.

METHODOLOGY:

An end of semester survey was designed for the last week of the class. The assessment survey questions are subjective in nature and were completed voluntarily by the students. The survey was prominently posted on the Engage learning platform at the beginning of the semester to alert the students of its presence in the course. Students were informed that the results of the survey were being used to improve the design structure of the class. Participation was voluntary, and survey responses were submitted into a 'drop box' that was embedded within the

course shell. -220 students submitted responses for this study with a return rate greater than 90%. Results from the survey were entered into JMP for analysis.

STATISTICS:

As noted in the manuscript "Moving Towards Mass-Customization in Higher Education" (Rau, 2021), the survey results were tabulated for 220 students - 81 males, 115 females with 24 individuals unidentified. Specific data was not captured as to whether all of the students engaged in this study were enrolled in their final course, however, it is estimated that more than 95% of the students were taking the last course of their program. Approximately 95% of the students were working professionals, with ages ranging from the mid-20's to early 50's. Approximately 5% of the students entered the MBA program directly after receiving their undergraduate degree and had no (or limited) professional work experience before beginning their program.

Students within the study group were enrolled in three different programs. Eighteen students in the study pursued a 'General' MBA. Eighteen students pursued an MBA in Accountancy. The preponderance of students in this study were pursuing an MBA in Economic Crime and Fraud Management, with a total of 160 students being enrolled in this discipline. Data was not captured relating to program participation for 24 students.

As might be expected, the student data captured for this study indicated a variety of preferred learning styles. 131 (~60%) students preferred to read and study alone, 48 (~22%) students preferred discussion and debate with their classmates, 13 (~6%) students preferred working in groups both in-class and outside of class, and 21 (~10%) students preferred a lecture format. Seven students (3%) did not indicate a preferred learning style. Rounding error accounts for the additional 1%.

There was essentially a bifurcation among the students as to the primary orientation to how they viewed their work. 103 (~47%) students were driven by principles, values and ethical considerations, 112 (~51%) students were driven by tasks to be accomplished, one student (0.5%) was driven by relationships, and four students (~2%) did not identify with a particular orientation. Again, rounding accounts for the additional 0.5%.

RESULTS:

Ten specific questions were asked of the survey participants that related to their preferred learning style:

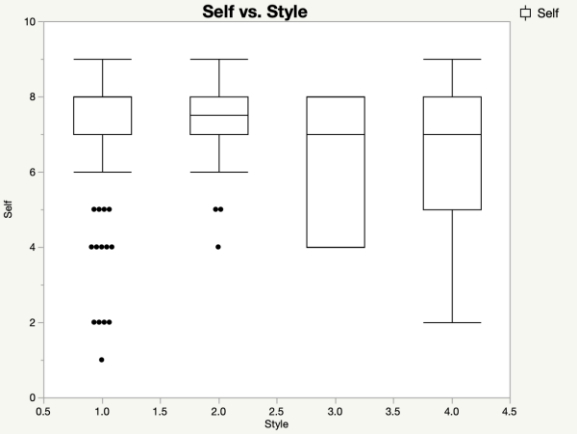
- Do you consider yourself to be a self-starter (need little direction to accomplish tasks)?
  (Ranged from 'Not at All' (scored as a '1'), to 'Dramatically' (scored as a '9'))
- Do you consider yourself to be creative?
  (Ranged from 'Not at All' (scored as a '1'), to 'Dramatically' (scored as a '9'))
- Do you see yourself as more idea-based, or activity-based (getting things done)?
  (Ranged from 'Idea' (scored as a '1') to 'Activity' (scored as a '9'))
- How flexible do you think you are?
  (Ranged from 'Not at All' (scored as a '1'), to 'Dramatically' (scored as a '9'))
- How much time do you need to recall facts, situations, experiences?
  (Ranged from 'Instant' (scored as a '1'), to 'Sometimes Hours' (scored as a '9'))
- Do you like working with others in groups?
  (Ranged from 'Not at All' (scored as a '1'), to 'Dramatically' (scored as a '9'))
- How much spontaneity about learning do you like?
  (Ranged from 'Not at All' (scored as a '1'), to 'Dramatically' (scored as a '9'))
- How much structure do you need to be able to learn?
  (Ranged from 'Lot of Structure' (scored as a '1'), to 'No Structure Necessary' (scored as a '9'))
- How effective were your classmates in enhancing your learning?
  (Ranged from 'Not at All' (scored as a '1'), to 'Dramatically' (scored as a '9'))
- How effective were you in advancing the learning of your classmates?
  (Ranged from 'Not at All' (scored as a '1'), to 'Dramatically' (scored as a '9'))

Box and Whisker graphs were created for the questions noted above and the student's preferred learning style. For the graphs presented below, group '1' represents a preferred style of reading and studying alone. Group '2'

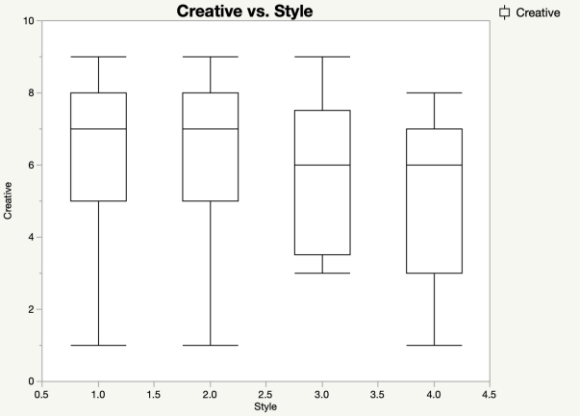
represents discussion and debate with classmates in class. Group '3' represents group work in class and outside of the class. Group '4' represents lecture. Some differences are noted for the four learning styles.

The Box and Whisker format was chosen for ease of viewing a large amount of data. Since this type of format is a descriptive statistics that graphically depicts groups of numerical data through their quartiles, identifies the median point of the data, and has lines extending from the boxes (whiskers) indicating variability outside the upper and lower quartiles, it was determined that this form of graphical representation would compactly present the results of the 220 students involved in this study.

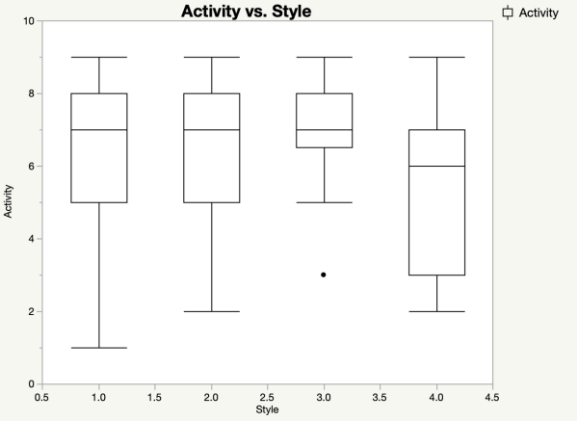
Graph 1



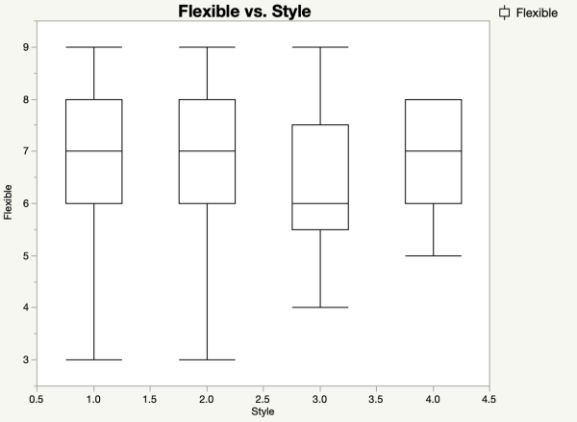
Graph 2



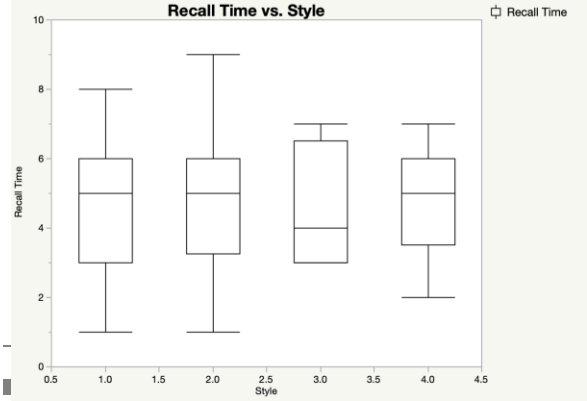
Graph 3



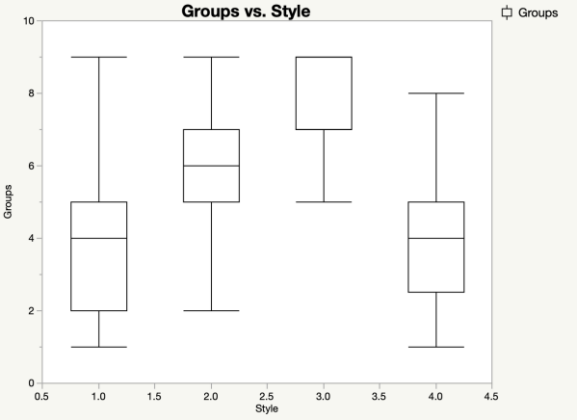
Graph 4



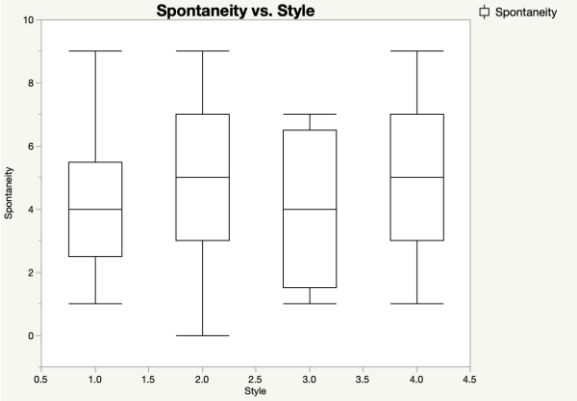
Graph 5



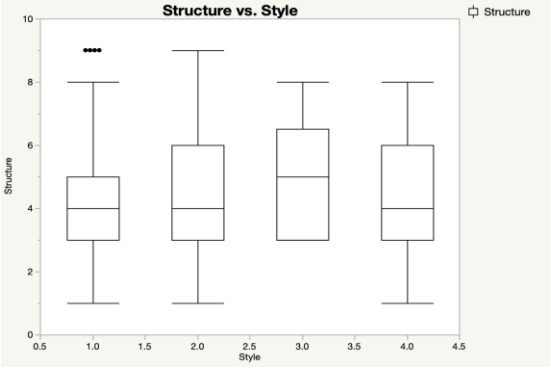
Graph 6



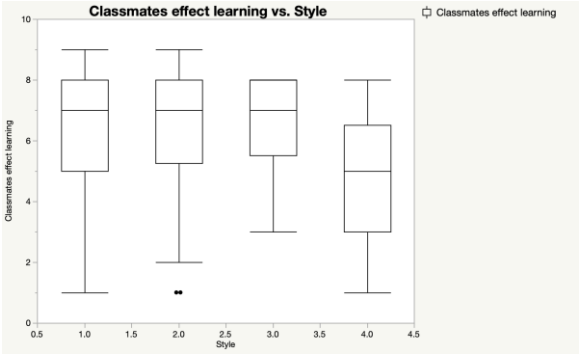
Graph 7



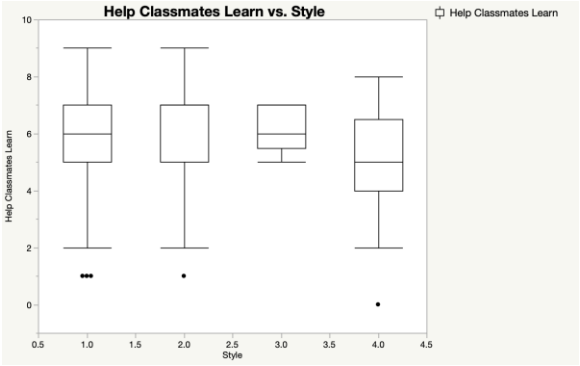
Graph 8



Graph 9



Graph 10



DISCUSSION:

As noted above, generally the scaling used for the graphs range from '1' (note at all), to '9' (dramatically). Graphs #3, #6, and #7 have specific ranges different than the other groups. Group '1' represents individuals who prefer to read and study alone, group '2' prefers discussion and debate with classmates in class, group '3' tend to more align with group work within and external to the class, while group '4' prefers lectures.

Graph 1 attempts to identify if a significant relationship with a particular learning style align with those individuals identifying as being self-starters or whether those individuals require more direction. While the majority of students with a 'reading and studying alone' learning style (group 1) tend to strongly identify with being self-starters, Graph 1 shows more outliers for this group than for the other three learning styles. Group '3' (group work in class and outside of the class) did not demonstrate a significant tendency for being either strong in self-direction or needing direction. The 'lecture' group (group '4') had the largest spread for self identification as being self-directed. The limited data available suggests that there might be a greater tendency for individuals with learning styles of 'reading and studying alone', and group '2' (discussion and debate with classmates in class) to be self-directed. If there is validity in this data, it might suggest that for groups '3' (group work in class and outside of the class) and '4' (lecture), may benefit from more guidance and direction from their instructors than groups '1' (reading and studying alone", and '2' (discussion and debate with classmates in class). As related to online learning environments, this might suggest that more detail being provided by the instructor, and also more oversight by the instructor would be beneficial for these students.

Graph 2 attempts to identify whether a relationship exists with an individual's self-perception of their creativity as related to their preferred learning style. This graph shows a significant distribution across the learning styles with group '3' and '4' indicating somewhat lower self-assessment than groups '1' and '2'. This might suggest focused effort on the part of instructors to help students demonstrate creativity. However, it is possible that the data presented here is biased because the vast number of students in this study were pursuing careers that might not be as amenable to creativity (accounting, and economic crime and fraud) as other academic paths, and the suggestion noted above may not be applicable to those programs.

Graph 3 explores whether the individual is more 'idea' focused, or 'activity' focused. Groups 1 and 2 (reading and studying alone, and discussion and debate with classmates) tend towards being more activity based, while group 4 (lecture) appears to be more amenable towards ideas. This might have implications for classes with a larger percentage of students representing group '4' to have 'thought' exercises, while for the other groups engagement that is more 'hands-on' (such as simulations, role modeling, and activities beyond reading and lecturing), might be useful. The graph indicates a wide distribution of responses for group '1', and this might be a factor of the size of the study population represented by the data.

Graph 4 focuses on how flexible is an individual. In this regard, flexible should be considered as not being rigid in regards to structure, input, and output. The third group (group work within and external to the class) shows the least tendency towards flexibility, and this might be an indication of the need for specificity in actualizing something such as a project or a group work activity. The other three groups might be more willing to 'roll-with-the-flow' and appreciate the 'unexpected'. This graph might also link with graph 3 above for group 3, in that group 3 for activity shows a tighter distribution for action (as in comparison to ideas) than the other three groups, however this might be an artifact of a smaller data set for this group.

Graph 5 focuses on the issue of how quickly individuals recall data and events. All of the groups tended towards the middle of the range, however the third group (group work within and external to class) tended towards a memory that was stated to be faster than the other three groups. This question was included to help determine an appropriate amount of time for testing or other time-sensitive activities, and it did not seem to indicate any special strategy for implementation to accommodate various student needs.

Graph 6 focuses on whether an individual prefers to work within a group or alone. Not surprisingly, individuals who prefer to read and study alone tended to score group activities less desirable, while the third group (group work within and external to the class) tended to assess group work favorably. Group 4 (lecture) did not assess this question highly (preferring to work alone), while group 2 (discussion with classmates) tended to assess group work higher than groups 1 and 4, but not as high as group 3. This has implications for online classes. While the number of students in this study tended towards desiring solitary work, according to the Human Dynamics work of Seagal and Horne (1997) the majority of students within the United States should be expected to be represented by group 2, and this becomes a potential challenge for online education. Therefore, strategies for delivery of educational material need to be structured for more group and interactive work when a larger percentage of the students within the class prefer discussion and debate with their colleagues.

Graph 7 focuses on spontaneity and this might have implications in class structure and delivery, and it may relate to how flexible is an individual. The median scores for all four groups was in the lower-middle range and it appears that the outliers where not as numerous. This might suggest that the delivery of course material might need to be 'predictable' for all students to allow a 'safe space' for learning. It is suggested that there is a difference being presented between graph 4 (flexibility) and graph 7 (spontaneity), and it may relate to a time dimension as to how material is being presented to the student.

Graph 8 focuses on the question of structure. The various groups tended to rate the need for structure highly, with the exception of the third group (group work internal and external of the class). It is possible that the third group's rating is linked to this group's tendency to actualize something, and this group's perception of creating a finished product allows for latitude in the final delivery of that product that should not be too constrained by structure. This conjecture might be further explored.

Graphs 9 and 10 focus on the questions of classmates learning by and with their classmates; graph 9 on the classmates impact on the individual, and graph 10 on the perceived ability of the individual to help their classmates

learn. Group 4 (lecture) tended to assess this component for both perspectives lower than the other three groups. Graph 9 suggests that the individuals believe they were more positively influenced by their colleagues, than they were helping their colleagues to learn (graph 10). It is possible that more group work within and external to the class may be beneficial, yet with the tendency for students in this database to prefer solitary work, this might not be an acceptable strategy for the group of individuals in this study.

CONCLUSION:

While there are some interesting indicators from this study, the structure of the dataset available for this study is a limitation. The dataset is constrained by the demographics of the individuals involved, that is, graduate students in an online MBA program predominantly focusing on economic crime and fraud who are working adults and almost all employed and working full time. It is very possible that the individuals involved in this dataset are not representative of the population of existing online students across the United States. It is also possible that a subtle influence by the investigator of this study unconsciously influenced the responses of the participants, and that the design of the questionnaire may be flawed. Further, since the participants in this study were all adults, their perception of their characteristics may be influenced by learned behavior and their environment over the span of their lives, and that might be a blind-spot regarding their perception of their world. Since this study was compiled for information gleaned from the capstone course of the student's program, course fatigue may impact the seriousness students utilized while completing the survey. Also, because the participants involved with this study had been involved with education for 18+ years, learned behavior from the extended time in the academic environment may influence the participants responses.

Consequently, this study should be broadened and include students who are younger in age. While this suggestion is appropriate for post-secondary education, it might also be of value to students in secondary education because of the increase prevalence of distance learning caused by the corona virus. It may be beneficial to include students who are actively engaged in online learning in addition to students still participating in face-to-face classroom learning. A study of this type should also include courses that are not focused on accounting and economic crime, because those career choices may influence the results of the study. Further, academics should propose additional strategies for improving the online learning experience to extend on what has been proposed in this paper.

The study also suggests that there may be value in having students within a class self-identify at the beginning of a course (in the class 'warm-up' first meeting) to assist a professor in determining the optimal approach of instruction and methodologies for that particular class. This strategy would require instructors to have an 'arsenal' of techniques and methodologies available to quickly respond to the varying needs of their students.

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Moving Towards Mass-Customization in Higher Education

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ABSTRACT:

The online capstone course for an MBA in Economic Crime and Fraud Management offered at Utica College was redesigned from a traditional structure (where the Instructor unilaterally decides all elements of the course) to a structure that is guided by a principle that attempts to utilize the concept of mass-customization and student centered learning. Analysis of key indicators, as measured by the graduate students enrolled in this graduate class, suggests that the redesign achieved improvement in key indicators.

Keywords:
Student centered learning, online course structure, mass-customization course design

INTRODUCTION:

In support of the work of Brocket (2016), noting that there are one dozen aspects of adult learners that must be considered, are numerous scholars including: Argyris & Schon (1974),Astin (1984), Bolkan & Goodboy (2011), Dewey as noted by Gabelnick et. al. (1990), Frymier & Shulman (1995), Hays (2008), Klem & Connell (2004), Kolb (1984), Linville (2014), Nolan & Richards (2014),Rodriguez, et.al. (1996), Schon (1983), Turner (1995), and Tyler (1949), Umbach & Wawrzynski (2005).

The course redesign work noted by Rau (2017) might be broadly characterized as supporting the theories of cognitivism, constructivism, experiential learning, humanism, andragogy, and pragmatism.

MODIFIED MASS-CUSTOMIZATION DESIGN:

In an attempt to create a 'mass-customized' offering for an online course that addresses strategy and leadership, the students are provided with eleven distinct pre-selected paths:general strategy, global strategy, leadership, sustainability, entrepreneurial, crisis management, government and public organizations, economic crime, organizational structure, change management, and ethics. Further, students may offer a proposal for a path that differs from the eleven noted above. Each student chooses a specific (and preselected) textbook for the course, and each week of the eight-week structure offers each student their choice of case study on which to read and write. As noted in the beginning of the syllabus:

> "Fundamentally, this course is learner-centered designed. You, the student, will have a significant choice in what you will learn, how you will learn it, and how you will demonstrate that you have acquired competence regarding the topic of strategy and/or leadership. This course design is unique in that it will simultaneously allow for both a broad and diverse appreciation of different focal areas of strategy, as well as the ability to explore in depth any topic with which the student is most interested. In order to take the fullest advantage of this design, students should adopt a 'Learning Community' perspective. That is, because each student will focus on an arena of personal interest, they will develop a more in-depth understanding of that focal area than potentially other students in the class. Therefore, each student will in essence become an 'expert' for their topic, and will be able to share their learnings of that specialty with their classmates. Consequently, as each student is submitting work that will be viewed by the entire community (for example, discussion posts), please consider yourself as the individual who has discovered new information that may be of value and help to your colleagues."

To supplement required text readings, separate reading lists were created for books, journals, and web sites for each path. As much as possible, these additional reading lists were designed to present students with free or inexpensive materials, and to serve as a useful resource for future use as the students progressed through their careers.

SEQUENCE OF EVENTS:

During the first week of the class, a Virtual Residency (VR) component was conducted. This VR was held the first week of the on-line class, and explained how the course was structured, and included three lectures. During the first week of the class, students were directed to complete a self-assessment of their preferred learning style. The format of the learning style follows the work of Seagal and Horne (1997). The purpose of this self-assessment was to assist individual students in determining the best option for their preferred learning style, and to help those students choose activities that would be most aligned with their learning style, while simultaneously achieving the knowledge and skills that would advance their careers and aspirations.

The second through fourth weeks of the class were predominantly structured by a 'traditional' syllabus, with the exception that students had their choice of texts, readings and case studies that aligned with their goals. Weeks five through eight where student-centered with students deciding on reading text materials, or books and articles from academic periodicals that aligned with their particular learning goals.

METHODOLOGY:

An end of semester survey was designed for the last week of the class. The assessment survey questions are subjective in nature and were completed voluntarily by the students. While it might be argued that subjective evaluations completed by the students lack necessary 'rigor' from a quantitative perspective as an assessment instrument, it might be argued that these questions are more concerned with the 'process' and structure of the course, and as to whether the course objectives were achieved. It might also be argued that in this specific case - a capstone course within a graduate professional program, where the evaluation is being performed by working professionals (many with middle and senior managerial responsibilities) - is actually highly valuable because these working professionals intimately know and understand the requirements of their industrial sector and are frequently the same individuals who are evaluating the performance of their associates, and are also responsible for the profitability and survivability of their organizations. As such, they might be considered valid assessors.

The survey was administered during the last week of the class. The survey was prominently posted on the Engage learning platform at the beginning of the semester to alert the students of its presence in the course. Students were informed that the results of the survey were being used to improve the design structure of the class. Participation was voluntary, and survey responses were submitted into a 'drop box' that was embedded within the course shell. Twenty-four students submitted responses for classes that were conducted before the design change, and 196 students submitted responses for classes conducted after the design change. The returns ratio for the before-design change was approximately 67%, while the return ratio for classes after the design change was approximately 95%. Results from the survey were entered into JMP for analysis.

STATISTICS:

Survey results were tabulated for 220 students - 81 males, 115 females and 24 individuals unidentified because the original survey did not include this question and these students were in the control group. Specific data was not captured as to whether all of the students engaged in this study were enrolled in their final course, however, it is estimated that more than 95% of the students were taking the last course of their program.

Students within the study group were enrolled in three different programs. Eighteen students in the study pursued a 'General' MBA. Eighteen students pursued an MBA in Accountancy. The preponderance of students in this study were pursuing an MBA in Economic Crime and Fraud Management, with a total of 164 students being enrolled in this discipline. Data was not captured relating to program participation for the control group (24 students), however it is known that the overwhelming majority of students in the study for the control group were receiving their MBA degrees in Economic Crime and Fraud Management.

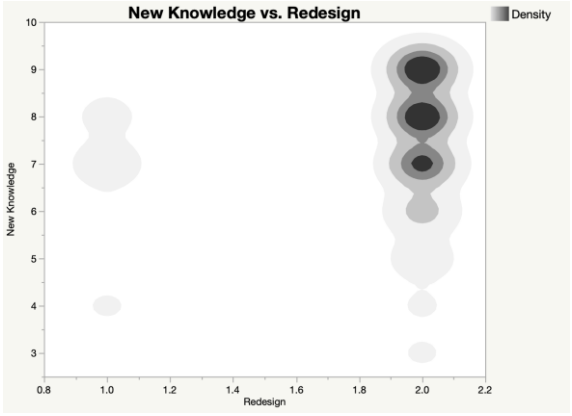
As might be expected, the student data captured for this study indicated a variety of preferred learning styles. 131 students preferred to read and study alone, 48 students preferred discussion and debate with their classmates, 13 students preferred working in groups both in-class and outside of class, and 21 students preferred a lecture format. Seven students did not indicate a preferred learning style.

There was essentially a bifurcation among the students as to the primary orientation to how they viewed their work. 103 students were driven by principles, values and ethical considerations, 112 students were driven by tasks to be accomplished, one student was driven by relationships, and four students did not identify with a particular orientation.

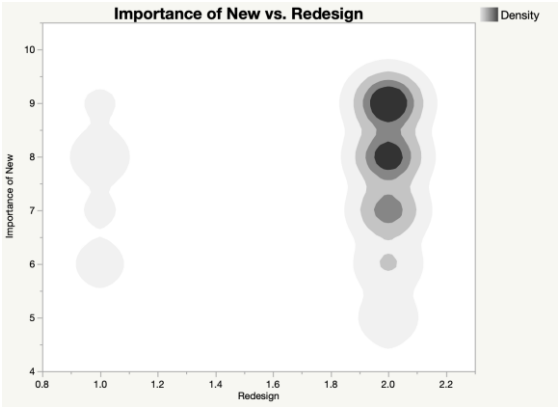
RESULTS:

Five contour-density graphs are shown below. While the survey questionnaire had 28 distinct questions, the five graphs below relate specifically to the question of whether the redesigned course model achieves the purpose of advancing knowledge for the students in their career path (questions #23-27). The horizontal axis indicates whether the classes were in the control group (#1), or whether they were in the redesigned class (#2). The vertical axis indicates the student self-identified level on a Likert scale of 1 through 9 where 1 is the minimal value, and 9 is the optimum value. It is noted for the first graph that the students identified tended too highly assess that the course provided new knowledge. This is also noted in the second graph where the students also highly rated the value or importance of the new knowledge in the redesigned course. The third graph focuses on whether the students believed that taking this course improved their ability to think critically. The fourth graph focused on whether the students were actively engaged with their major research paper (the topic they selected) for the course, and the fifth graph focused on whether the students believe they improved their ability to create strategic plans for their field of expertise.

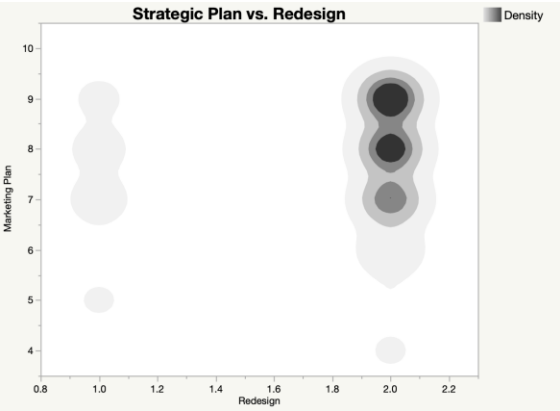
Graph 1



Graph 2

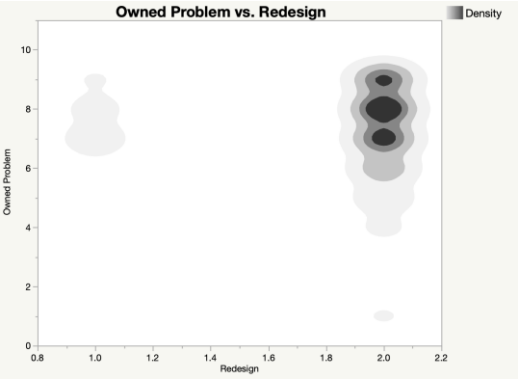


Graph 3



Graph 4

Graph 5



DISCUSSION:

The five graphs above suggest that the redesigned structure for the course achieved positive results. A sampling of student comments support this contention:

> Regarding my learning style, I like to learn independently and explore areas that interest me. I also like to look for similarities and how things are connected. I caught myself trying to do that as I was going through the readings. I think the ability in this course to have some freedom to look further into areas we have an interest in will appeal to me.
>
> While looking through the different learning styles, I realized I don't think I can fit in one section to be described. I enjoy parts of each of the various learning styles. I know I work well with structure and planning but don't necessarily like to be restricted. I like structure in curriculum but enjoy those classes that allow for creative flexibility.
>
> Since I am a physical learner, throughout my degree program, I have tried to connect my experience with the concepts I have studied in classes or created situations at work to test the concepts. For this class, I will share examples from my experiences to discuss concepts. I also know that I have to have a purpose to start an activity, having a clear idea of what I want to write my paper on will be important as I begin my research. I will also have to have a strategy or plan for attack prepared before I start the project.

I learned that my learning style is Emotional Physical, EP. I can utilize this to create a path for learning by utilizing the skills in the guide. One of the key takeaways from the reading for me is the need for someone with my learning style to gain clarity of feelings by understanding them precisely as a means to release internal tension. Knowing this as I move forward will help me to be more productive.

While I will look to use the MP model as my path for learning. I am also looking forward to observing my classmates' own learning styles, and potentially adopting different methods. I have also never actually assessed my learning style prior to this class, so I am eager to understand it more and make effective changes where appropriate.

My best learning style is through interactive work. In two courses in grad school, I have done business simulations. One on my own and one in a group. I really like the simulations because it gives you real life experience with no risk. It's exciting to see how you progress and even gives you a little competition. I also work well learning about things that I'm interested in. I think this course will be interesting because we get to choose our own topics to write about and reading material.

A number of issues need to be addressed. While it was evident during the timeframe this study was conducted that students appreciated the structure of each student becoming a 'content expert' for their domain, this element might be a factor of the underlying work ethic and self-drive that the students demonstrated for the various cohorts in this study, and the design might not be appropriate for students who are lacking in motivation - although this possibility should be investigated. The course utilized for this analysis is the capstone course in an online graduate MBA program primarily focusing on Fraud and Economic Crime. The aspect of this online course is that there is no person-to-person contact as might be present in a typical classroom environment, and this might be an important factor in considering the results of survey as demonstrated in the five graphs noted above. Consequently, any conclusions reached from the limited sample size and structural components of the course must be approached with caution. It is possible that this design may be appropriate for upper-level undergraduate and graduate classes, but it might not be appropriate for a freshman class. The issue that 95% of the student population in this investigation were full-time professional employees, and a significant number of the students were at managerial levels within their organizations also constrains the applicability of this design to a larger population of students. Another issue that needs to be addressed from a pedagogical perspective is that the instructor of this course had working familiarity with all topics presented in the course as potential avenues of study and was therefore able to help facilitate a learning environment from an inter-disciplinarily perspective. A further issue that might be noted is the small size of the control group used for this study.

CONCLUSION:

However, the results of the inquiry suggest that this design structure might be appropriate for other classes and majors. It is suggested that other academics investigate this course design to determine whether it might be of value in their disciplines, and whether their students may benefit from a course design where the students are unconsciously being designed into the course as co-contributors (from their 'content-specific-expertise that they have chosen), and to specifically create a 'learner-centered' course structure.

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Digital Marketing and Marketing Education: A Review of Marketing Curriculum in AACSB-Accredited Business Schools

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ABSTRACT

The rapid growth of digital marketing technologies has transformed marketing practice and created demand for digitally savvy marketing graduates. Over the past decade both scholars and practitioners have called for a marketing curriculum overhaul to better align it with current marketing practice. This study examines 545 AACSB accredited business schools within the United States to determine the extent to which digital marketing courses and specializations are offered in undergraduate marketing programs. Results are compared to previous findings. Our results suggest that business schools are committing more resources to the digital marketing field of study by offering more courses and specializations in the form of majors, concentrations, and certifications.

Keywords: digital marketing, digital marketing curriculum, curriculum development, digital marketing education

INTRODUCTION

The explosion of digital technologies has transformed marketing practice. The 21st century has experienced a communications revolution with digital marketing and social media changing the way consumers receive and use messages (Crittenden and Crittenden 2015). As pointed out in a recent IAB report, businesses have reallocated their advertising budgets, spending far more on internet than any other media. Internet advertising revenues in 2019 grew 16 percent reaching over 124 billion dollars with social media advertising accounting for nearly one-third of these revenues (IAB Report 2019). Similarly, a recent *Social Media Marketing Industry Report* found that 9 in 10 companies used social media for marketing purposes (2019). Furthermore, the increased reliance on digital and social media formats has produced a multitude of data, metrics, and new tools (Spiller and Tuten 2015). Companies, as a result, have invested in data analytic tools and software to analyze the abundance of consumer data.

Given the widespread use of digital technologies, there is growing demand for marketing graduates who are digitally savvy and technologically proficient. Beachboard and Weidman (2013) surveyed ad agency managers to determine the skills they expected of recent graduates. Results indicated employers wanted new hires with experience in SEO, paid search and display advertising, as well as technical skills in creative suite software. Similarly, Frederiksen (2015) noted specific digital marketing skills sought by employers including content marketing, SEO, social media management, and marketing software skills. More recently, a comprehensive review of entry-level jobs for marketing graduates found that over three quarters of the job listings included one or more analytical or technological skill categories with database skills, data analytics and web analytics being associated with higher salaries (Schlee & Karns 2017). In fact, EMIS (2017) reported that digital marketing jobs showed a growth rate of 30 percent over traditional marketing roles and took 16 percent longer to fill than other postings.

Both practitioners and scholars have questioned whether business school marketing curriculum has maintained pace with the changes influencing marketing practice. In a 2016 survey of nearly 1,000 marketers in companies located in the United States and United Kingdom, competency-based tests revealed that only 8% were able to demonstrate entry-level digital marketing skills. Additionally, over two-thirds felt they needed to improve these skills to remain competent in their current job (O'Brien 2016). Spiller and Tuten (2015) identified a growing gap between academically focused marketing programs and the needs of marketing executives. They questioned whether college marketing courses taught relevant quantitative concepts and metrics needed for the marketing profession. Likewise, Frederiksen (2015) concluded that the skills considered the "bread and butter" of successful digital marketing practitioners were chronically undertaught in colleges and universities.

The advances in digital technology have been so significant to the marketing profession that many have called for an update, and in some cases an overhaul, of the marketing curriculum. Nearly a decade ago, Wymbs (2011) challenged colleges and universities to offer a separate degree program or at least a course in Digital Marketing. Given the dramatic change in the environment, some educators proposed expanding current digital marketing courses into a dedicated major (Parker 2014), while others recommended a complete overhaul of the marketing

program by placing digital marketing at the center of the curriculum (Rohm, Stefl, and Saint Claire 2018). Other researchers have called for curriculum reform to include marketing metrics (Spiller and Tuten, 2015), social media (Brocato, White, Bartkus, and Brocato 2015), and analytics (Wilson, McCabe, and Smith 2018).

A common thread among these articles is a call to develop curriculum that is more in tune with the current digital marketing environment. Despite these calls for reform, few studies have comprehensively examined the extent to which business schools have now incorporated digital marketing into marketing program curricula. To what extent have business schools closed the gap by developing courses, majors, and other specializations in digital marketing? Consequently, the purpose of this study is to perform an empirical investigation of undergraduate digital marketing courses in business schools accredited by the Association to Advance Collegiate Schools of Business (AACSB). Two specific objectives are (a) to determine the extent to which digital marketing courses have been incorporated into marketing program curricula compared to previous findings and (b) to investigate how course offerings and specializations have evolved.

PREVIOUS RESEARCH

A review of relevant literature reveals several themes related to digital marketing curricula development and adoption. These major themes focus on: (1) methods used to develop digital marketing courses, (3) approaches used to overhaul the curriculum or develop a major, and (3) assessments of the extent to which digital marketing courses and specializations have been implemented in business schools.

Numerous articles focus on methods used to design and deliver courses with relevant and timely digital marketing content. Key, Czaplewski, and Ferguson (2019) present a course design which gives students hands on experience using relevant digital marketing tools. They describe a semester project in which students create original content, perform keyword research, implement Google Ads and social media campaigns, analyze results, present a final report, and become Google Ads certified. Similarly, Spiller and Tuten (2019) build a case for incorporating online digital marketing training and certification programs into courses. They describe using branded digital marketing certification programs such as Hootsuite, Google Ads, and Google Analytics to expose students to current resources and gain hands-on experience. Research has also focused on the inclusion of social media and analytics courses in the marketing curriculum. Faulds and Mangold (2014) describe a framework for creating a dedicated social media course that encompasses program goals, learning objectives, and instruction activities. Spiller and Tuten (2015) demonstrate how analytics from social media can be incorporated in marketing classes. Likewise, Wilson, McCabe, and Smith (2018) provide a template for creating a dedicated marketing analytics course.

Additional literature provides insights into developing an academic major in Digital Marketing. Wymbs (2011) proposes a marketing curriculum redesign that is consistent with current business needs. He describes the process used to establish a Digital Marketing major at Baruch College and then provides details of the new curriculum. Building on the work of Wymbs, Parker (2014) proposes a method for expanding current digital marketing course offerings into a major or minor in Internet Marketing. She addresses five issues and challenges for universities seeking to expand their digital marketing offerings. More recently, Rohm, Stefl and Saint Clair (2018) highlight the creation of a "digital first" marketing curriculum that aligns with industry practice. The authors describe the M-School program at Loyola Marymount University, a program which places digital marketing at the center of the curriculum.

A third area of research involves assessing the extent to which business schools have incorporated digital marketing coursework into the curriculum. Wymbs (2011) conducted a small-scale digital marketing curriculum audit where he took a random sample of small, large, and private business schools listed in the *Fiske Guide to Colleges*. He found that large and private business schools had slightly more digital marketing offerings than small counterparts. He also found that urban universities tended to offer more digital marketing courses than their rural counterparts. He speculated that both demand and supply factors came into play. For example, media centers in New York City provided a fertile ground for adjuncts to teach new courses and students in urban areas were more aware of emerging trends creating greater demand.

As a follow up to the Wymb's curriculum review, Munoz and Wood (2015) reviewed the digital marketing course offerings in both the top-ten undergraduate and graduate marketing programs. They found only one of the ten schools offered a dedicated social media course at the undergraduate level. However, four other top-ten universities did include the topic of social media in other digital marketing courses. They continued their investigation by surveying 86 marketing educators that taught social media in their courses. They found over a third of the

individuals surveyed offered a dedicated social media class. However, there was little movement to create programs or minors related to social media.

Using data from Marketing Edge (formerly the Direct Marketing Education Foundation) Parker (2014) presented an overview of universities offering specializations in digital marketing. Parker reported that while many universities offered a course in digital marketing, the development of a major in the subject had been slow. According to information provided on the Marketing Edge website, 19 universities offered a digital marketing concentration, certificate, specialty option or major. A more recent review of data from the Marketing Edge website (2018) revealed that the number of universities offering specializations in digital marketing had increased to at least 25.

Two additional studies analyzed the extent to which digital marketing courses had been incorporated in the marketing programs of AACSB accredited schools. Price (2018) investigated the extent to which small business schools (i.e., 35 or fewer full-time faculty) implemented digital marketing and social media into the curriculum. Of the seventy schools examined, approximately 33 percent offered one digital marketing related course with another 10 percent offering two or more. Only three schools out of the seventy examined offered a specialization in the form of a major, minor, concentration or certificate in digital marketing.

More recently, Langan, Cowley and Nyuyen (2019) conducted the first comprehensive examination of the state of digital marketing in the marketing education landscape. They analyzed 529 United States AACSB undergraduate marketing programs to ascertain the adoption of digital marketing courses. They found a broad range of digital marketing courses adopted in the majority of business schools with the adoption varying by institution type. They also found that digital marketing courses were becoming requirements for marketing degrees with more schools creating opportunities to specialize.

METHOD

To further investigate the extent to which U.S. business schools have incorporated digital marketing into undergraduate curricula, we used an approach similar to the Langan, Cowley and Nguyen (2019) study. The process began by reviewing a list of 545 United States accredited business schools contained in the 2019-20 AACSB-Accredited Universities and Business Schools membership database. Membership profiles were reviewed to determine background data on each college/university. For each member school, we recorded the number of full-time faculty, the school affiliation (whether public or private), the region in which the school resided (Northeast, Southeast, Southwest, Midwest, or West) and the Carnegie classification of the school. The 11 classifications were subsequently grouped into four categories: baccalaureate, masters, doctoral, and research universities.

Once schools were identified and profile data collected, we visited the websites of each business school to retrieve information related to its digital marketing course offerings. Two research assistants collected data from the 545 AACSB-accredited colleges and universities. To help ensure accurate data collection, the lead researcher outlined a search protocol specifying the type of data to collect. The two research assistants were instructed to gather data only from those schools that offered an undergraduate marketing major or an option to specialize in marketing as part of an undergraduate business degree. Thus, schools that only offered a marketing minor or only offered digital marketing classes at the graduate level were excluded. After searching school websites, we found that 53 out of 545 (9.7%) did not meet the inclusion criteria, leaving a total of 492 schools in the sample.

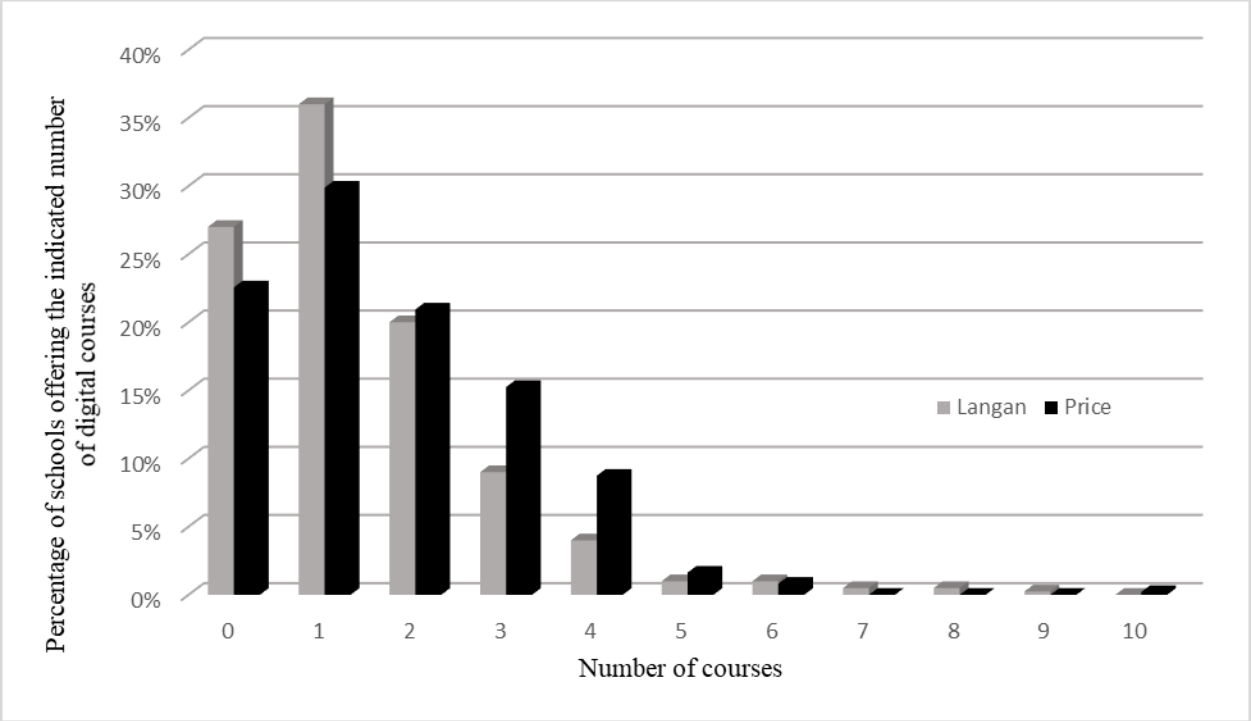
We then reviewed marketing program curriculum requirements and course descriptions obtained from the remaining schools' websites. For each school we recorded the names of any course within the marketing program related to digital marketing, such as, internet marketing, digital marketing, marketing analytics, social media marketing, and the like. Research assistants were instructed to only gather data from courses listed in the undergraduate marketing curriculum. If a college or university, for example, offered a course in social media through the communications department or at the graduate level, it was not included in the data. We also documented if the school offered an undergraduate specialization such as a digital marketing major, concentration/track, or certification.

FINDINGS

Research results indicate that digital marketing course offerings have increased since the initial study was conducted. Langan, Cowley and Nguyen (2019) found that 73% of the 477 business schools analyzed offered at least one digital marketing course. In the current study, we found a slight increase with 77% of the 492 schools analyzed offering at least one digital marketing course. This represents a 5% increase in the number of business schools offering digital marketing within the undergraduate marketing program.

A more significant increase was observed in terms of the number of digital marketing courses offered by individual schools. Langan et al. (2019) observed a range of zero to nine digital marketing course offerings (see Figure 1) with 27% of schools not offering a digital marketing course of any type, 36.4% offering a single digital marketing course, and the remaining 36.2% offering two or more courses. In contrast, we found that the percent of schools not offering a digital course of any type dropped to 23% with the percent of schools offering one course dropping to 30% and the percent of schools offering two or more courses rising to 47%. Furthermore, when excluding institutions that did not offer a digital marketing course, Langan, et al. (2019) found that the remaining schools offered an average of 1.92 digital marketing courses. This average rose to 2.16 in the current study.

Figure 1: Number of Digital Course Offerings Per Institution



A wide array of digital marketing course names was identified in both the Langan et al. (2019) study and our study. In both studies researchers found that most digital course titles could be grouped into distinct topic areas. For example, course titles such as social media marketing, social media and marketing strategy, and special topics in social media could be classified as one social media course category. In the Langan et al. (2019) study, researchers found that digital marketing course offerings most often fell into the following categories: Digital, Internet, and E-Marketing; Analytics and Insights; Technology and Apps; Social Media; and Mobile Marketing.

In our study, the majority of digital marketing course offers fell into similar categories including: Digital, Internet, and E-Marketing; Marketing Analytics; Social Media; Web Design and Technology; and Mobile Marketing. Table 1 summarizes the percentage of schools offering at least one course in each of the topic categories and compares results from the Langan et al. (2019) study to our study.

Table 1: Extent of Digital Marketing Course Offerings

Langan Study		Current Study	
Course Topic	**% of Schools Offering Topic**	**Course Topic**	**% of Schools Offering Topic**
Digital, Internet and E-Commerce	31%	Digital, Internet and E-Commerce	63%
Analytics & Insights	29%	Marketing Analytics	42%
Social Media	8%	Social Media	33%
Mobile Marketing	2%	Mobile Marketing	2%
Technology & Apps	9%	Web Design & Tech	2%

One notable difference between the results reported in the Langan et al. (2019) study verses the current study is the increase in percentages of schools offering specific course topics. For example, the percentage of schools offering an introductory Digital, Internet, or E-Marketing course jumped from 31% in the original study to 63% in the current study. Likewise, the percentage of schools offering at least one course in Marketing Analytics or Social Media also increased from 29% to 42%, and 8% to 33%, respectively. The percentage of schools offering specific courses in Mobile Marketing or technology related courses such as Web Design remained low. It should be noted that the differences found between the first and second study may have partially been due to differences in the way the researchers classified specific course titles into topic categories.

The researchers also found an increase in the number of schools offering concentrations, majors, and certifications in digital marketing. As shown in Table 2, Langan et al. (2019) found that for institutions offering specialized digital marketing programs, 48 offered concentrations or tracks, 9 offered majors, and 9 offered certifications. In the current study we found 45 concentrations/tracks, 24 majors, and 27 certifications among schools offering specialized digital marketing programs.

Table 2: Extent of Digital Marketing Specializations Offered

Digital Marketing Specializations	Langan Study	Current Study
Concentrations/tracks	48	45
Majors	9	24
Certifications	9	27
Total	66	96

Measures

Similar to the Langan et al. (2019) study we conducted a multiple regression analysis to test whether the university or other environmental factors influenced the number of digital marketing courses offered. To simplify comparison with Langan et al. (2019) we followed the same coding conventions when possible. Independent variables were coded as type of institutional *affiliation* (0 = private; 1 = public); *region* was coded using the National Geographic regions (1 = Northeast; 2 = Southeast; 3 = Southwest; 4 = West; 5 = Midwest); and Carnegie *classification* (1 = master's; 2 = doctoral; 3 = bachelor's; 4 = research).

The *faculty size* categories were based on AACSB definitions and reported the number of full-time faculty in each business school as follows:1 = small faculty with fewer than 35; 2 = medium faculty with 35 – 74; 3 = large faculty with 75 or more. We also collected number of full-time business student enrollment as a control variable for university size.

The means, standard deviations, and correlations among the variables in the study are shown in Table 3. Significant correlations between faculty size and both digital marketing courses offered ($r(492) = .440$, $p < .001$) and the offering of a digital market specialization ($r(492) = .210$, $p < .001$) provide initial support for our research questions, that faculty size is related to the number of courses and the existence of a specialization. However, the high correlation between number of full-time business students and faculty size ($r(427) = .670$, $p<.001$), affiliation ($r(427)=.145$, $p<.01$), Carnegie classification ($r(427)=353$, $p < 001$), digital marketing course offerings ($r(427)=.391$,

p< . 001), and digital marketing specialization (r(427)=.266, p<.001) suggests that any analysis should be careful to consider the effect of institutional size.

Additional analysis also found significant correlations between faculty size and Carnegie classification (r(492)=.426, p <. 001), which is likely higher given the unusual category coding (1=master's, 2= doctoral, 3=bachelor's, plus our addition of 4=research) utilized in the Langan et al. (2019) study and ours as well. Affiliation did not have a significant correlation with any of the dependent variables, suggesting that it likely will have little effect in subsequent analysis. We include it in further analysis to remain close to the original Langan et al. (2019) study.

Table 3: Means, Standard Deviations, and Inter-correlations Among All Variables

Variable	M	SD	1	2	3	4	5	6
1) FT Business Stnts	1823.10	1800.68	--					
2) Affiliation.	.70	.46	.145**	--				
3) Geographic Region	2.83	1.51	-.026	.197***	--			
4) Faculty size	2.03	.80	.670***	.044	.002	--		
5) Carnegie Class	2.21	1.36	.353***	.079	.067	.426***	--	
6) Digital Mkt Course	1.68	1.42	.391***	-.023	.052	.440***	.227***	--
7) Digital Mkt Spec	.19	.54	.266***	.010	.035	.210***	.054	.458***

NOTE: n=492, (n=427 for FT Business Students comparisons), * p<.05, ** p< .01, ***p<.001

Working from the model presented in Langan et al. (2019), we first ran a regression analysis to further explore their model, then specifically examined the differences for our dependent variables for each of the independent variables of *affiliation*, *geographic region, faculty size*, and *Carnegie classification*. The regression model controlled for number of students using the full-time business student variable, then examined the effect of the independent variables noted on the dependent variable. The significance of the difference in the mean number of digital market courses offered between each instance of the independent variables was also specifically evaluated using ANOVA and/or t-tests. The goal was to find if the *number of digital marketing courses offered* differed significantly between the groups of the variables considered.

Regression

A hierarchical regression analysis was performed to examine the effect of the independent variables on the number of digital marketing courses offered. A summary of these results is presented in Table 4. As can be seen in the table the model was a weak predictor of the number of digital marketing courses offered (ΔR^2=.022, F(3, 422) = 3.856, p< .05).

Table 4: Hierarchical Regression Results for Number of Digital Marketing Courses Offered

	Digital Marketing classes Offered		
Variable	β	R^2	ΔR^2
Step 1			
FT Business Students	.000296***	.153***	.153***
Step 2			
Affiliation.	-.317*		
National Geographic Region	.0633		
Carnegie Classification	.118*	.175*	.022*

NOTE: * p<.05 **p<.01, ***p<.001, n = 427

Affiliation (public/private)

The Langan et al. (2019) regression found that public universities offered fewer digital marketing courses than private. The negative Beta in our results ($\beta = -.317$, $p<.05$) supports this with our data, although the relationship is weaker and only marginally significant. A t-test, however, did not show any significant differences in number of digital marketing courses by affiliation $t(490)=.516$, $p>.05$. This aligns with Wymbs (2011) findings that large and private institutions had only marginally more digital marketing offerings.

Our mixed results could be masking the impact of institution size, as public institutions are often but not always larger than private institutions, even with our control for the number of full-time business students enrolled. It could also be due to smaller teaching loads for many public universities which could lead to offering fewer specialized courses.

Region of country

Our regression results confirmed the findings of Langan et al. (2019) in finding no significant relationship between the number of digital marketing courses offered and the region of the country where the institution is located. To further examine this we ran an ANOVA to examine the significance of the group mean differences between the regions without the other variables for the number of digital marketing courses offered. The results also did not show any significant differences by region $F(4, 487)=1.494$, $p>.05$). These findings confirm Langan et al.'s (2019) results but are juxtaposed to Wymbs (2011) who found that urban universities tend to offer more digital marketing courses. It seems probable that the Northeast and West regions would stand out, given the prevalence of large cities in New York and California. It could be, however, that there are enough smaller, rural universities in those regions to offset the larger, urban institutions.

Carnegie classification

For Carnegie classification, previous research found no relationship between the number of digital marketing courses offered and classification type. Our results differed as we show a weak positive relationship ($\beta =.118$, $p<.05$), even controlling for full time business enrollment. Specific ANOVA results show significant differences between the Carnegie level (Masters, Doctoral, Bachelors, Research) and the mean number of digital marketing courses offered ($F(3,488) = 14.425$ $P<.001$.)

There are a couple of possible explanations for this result. First, we added a fourth category for Carnegie (Research institutions) which was not included in the previous Langan et al. (2019) study. While we found a significant correlation between Carnegie classification and digital marketing course offerings ($r(492)=.227$, $p<.001$), we also found that Carnegie classification was correlated with number of full-time business students ($r(427)=.353$, $p<.001$) and faculty size ($r(496)=.426$, $p<.001$), even though we followed the coding used by Langan et al, (2019) which categorized the first three Carnegie groups as (1=master's, 2= doctoral, 3= bachelor's) and added a fourth (4=research) category. The unusual numbering could be confusing the linear relationship between size, Carnegie classification, and course offerings. Examining the mean number of digital course offerings for each type of Carnegie classification the pattern is more clearly broken out as the mean for Bachelors (.971), Masters (1.423), Doctoral (1.682) and Research (2.217) increase in a generally linear fashion. The high correlations between the various size measures and Carnegie classification would support the idea that bigger schools tended to be higher Carnegie and also offer more digital marketing classes.

Faculty size

Our research expanded the previous research by examining the relationship between business faculty size and number of digital marketing courses offered. Results as shown in Table 5 of a new regression model showed that business faculty size was a significant determinant of the number of digital marketing classes offered, even controlling for the size of the institution ($\Delta R^2=.091$, $F(4, 421) = 12.707$, $p< .001$). This supports the idea that the number of faculty are a probable determinant of the number of digital marketing courses offered. It is reasonable to assume that having a larger number of faculty members facilitates the ability to offer a larger array of choices in course offerings.

Table 5: Regression on Digital Marketing Courses

	Digital Marketing classes Offered		
Variable	β	R^2	ΔR^2
Step 1			
FT Business Students.	.000119*	.153***	.153***
Step 2			
Affiliation.	-.257		
National Geographic Region	.0717		
Carnegie Classification	.0236		
Faculty Size	.674***	.244***	.091***

NOTE: * p<.05 **p<.01, ***p<.001, n = 427

Digital Marketing Specialization

This study then continued to expand its analysis by examining the relationship between the same variables (*affiliation, region, faculty size, and Carnegie classification)* and whether a *digital marketing specialization* (dependent variable) was offered by the school. The presence of a *digital marketing concentration or major* was coded as a (0= No Digital Mkt Specialization, 1= Concentration only, 2=Major only, 3=Major and Concentration).

Table 6: Regression on Digital Marketing Specializations

	Digital Marketing Specialization		
Variable	β	R^2	ΔR^2
Step 1			
FT Business Students.	.00007**	.071***	.071***
Step 2			
Affiliation.	-.0176		
National Geographic Region	.01362		
Carnegie Classification	-.0307		
Faculty Size	.046	.082	.011

NOTE: * p<.05 **p<.01, ***p<.001, n = 427

The regression model was not significant (ΔR^2=.011, F(4, 421) = 1.259, p> .05). Further analysis of the individual variables found mixed support for differences in the mean value of marketing specialization. ANOVA results show that larger faculty in the business school has a higher mean specialized digital marketing program value F(2,489) = 11.757, p<.001). This indicates that the larger the faculty the more likely there is going to be a specialized digital marketing program, however as shown in the regression and correlation this appears to be largely a function of the school being larger. These results align with and reinforce the finding that having a larger faculty and school is positively related to having a digital marketing specialization.

Significant mean differences in digital marketing specializations were not found for affiliation (t(490)= -.211, p>.05), geographic region(F(4,487)= 1.258, p>.05), or Carnegie classification (F(3,488)= .940, p>.05).

SUMMARY DISCUSSION

Our study comprehensively examines the extent to which AACSB business schools have incorporated digital marketing courses within their marketing program curriculum. It also compares results to previous studies conducted by Langan, Cowley and Nguyen (2019) and Wymbs (2011) to determine what changes have occurred over the past several years.

While the percentage of schools offering at least one digital marketing course has not substantially increased, the percentage of schools offering more than one digital marketing course has. This suggests that business schools are

committing more resources to the digital marketing field of study and offering more than an introductory overview course. This is a welcome finding given the growing demand for employees with digital marketing skills.

Social Media is one digital marketing topic area that appears to have gained significant coverage. In the Langan et al. (2019) study, they found that only 8% of surveyed institutions had a dedicated course in social media. Just two years later, we found that 33% of AACSB institutions had a dedicated social media course. This could be a response to the work of Faulds and Mangold (2014) and Spiller and Tuten (2015) that showed how to design and teach social media skills.

Our research highlights the continued positive steps that many universities are making towards improving the employment opportunities for marketing students by addressing the increasing skills gap. O'Brien (2016) noted this gap in his finding that only 8 percent of survey respondents were able to demonstrate basic digital marketing skills. This improvement is especially welcome, given the high growth rate of digital marketing jobs over traditional marketing ones (EMIS, 2017).

Along these lines is the call for increasing the number of digital marketing specializations in the form of a major, minor, concentration, or certification. While the number of concentrations offered has remained steady, the number of majors and certifications has almost tripled. These additional qualifications assist employers in assessing the skillsets of college graduates and allow students to set themselves apart when searching for jobs. While our research found that having a larger faculty size is conducive to offering a digital marketing specialization, it is possible for smaller institutions to offer them as well perhaps by incorporating data analytics courses into the curriculum.

Finally, this study provides researchers with a deeper understanding of the factors affecting the number of digital marketing courses and specializations offered in business schools. The goal of such research would be to: (1) suggest more effective ways to address the skills gap of marketing graduates and (2) to offer deans and department chairs guidance as they determine the most appropriate mix of digital marketing offerings.

Future Research

As the stream of research on incorporating digital marketing into the marketing curriculum continues to grow, it would be helpful to explore reasons why some universities still fail to offer instruction in digital marketing. It may be that some schools lack the funds necessary to staff an additional course. Alternatively, some schools may struggle to find individuals with appropriate technical skills needed to teach the course. Perhaps doctoral granting institutions are not incorporating digital marketing coursework in their programs at the doctoral level and therefore do not produce future faculty with digital marketing expertise. Further research could help determine if doctoral granting institutions are now preparing future professors to teach digital marketing courses.

Additionally, it is critical to learn how to effectively teach students the digital marketing skills and knowledge they will need for the marketplace. Academic and practitioner partnerships are needed to determine what skills and knowledge students will need for entry-level marketing positions. Periodic curriculum reviews are necessary to make sure marketing education is in line with the demands of students and future employers.

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Blockchain: What It Is, What We and Our Students Learned - A Policy Research Project

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ABSTRACT

This paper recounts how a narrow policy research project with a multidisciplinary team of undergraduates and faculty, concerning how blockchain might address shareholder-related ownership and voting issues, led to our coming to know, then addressing, the level of understanding of blockchain technology among a subset of the public: state government staff; elected legislators; university students, faculty and staff (including upper-level campus administrators); and other members of the public. We include how the workshops we developed can incorporate hands-on blockchain education into the university-level accounting and business curricula.

Keywords: blockchain, stock certificates, hands-on workshops, Ethereum

INTRODUCTION

"Blockchain" is a word that was not in the lexicon of most students and faculty and members of the public even five years ago; but many now have heard the term, and perhaps even more have heard the term "Bitcoin". We will describe in later sections details including the relationship between public and private blockchains and various cryptocurrencies. For now, we note that Bitcoin and blockchain are not the same; the innovative cryptocurrency Bitcoin has become only one of many applications of blockchain technology, residing on the public Bitcoin blockchain. Other important blockchains include the public Ethereum blockchain, which supports the cryptocurrency known as Ether, along with so-called smart contracts. IBM and others have developed private blockchains as well. In general terms, blockchains are designed to enhance document and digital asset integrity and security, while providing for transparency and decentralization, which allow users access to business and governmental documents for remote processing in a timely way.

In the 2019 Blockchain Survey (Deloitte Touche Tohmatsu Limited, 2019) from Deloitte, Consulting, LLP (the largest of the Big Four CPA firms in the world), 86% of the participants responded that blockchain technology was scalable and will eventually achieve mainstream adoption. In that same survey, 28% of responders indicated one of the barriers to greater investment in blockchain is the lack of in-house application skills and understanding of blockchain. It could be inferred that an area that would enhance blockchain application would be educating employees about blockchain applications. In addition, our research indicated that government officials and legislators were not sufficiently educated in what blockchain was, but had the desire to learn more, since they believed blockchain could revolutionize the recording of information by using a distributive ledger approach. We found that while there are those who understand potential applications of blockchain, they typically do not have the educational background to understand more specifically how one could implement blockchain technology into business and governmental environments. As long as government officials and more generally the college-educated public are not appropriately informed of the technology, roll out and adoption of new applications will be minimized, thereby not meeting an identified need in government and business. As such this project included several blockchain computer application workshops. These coding workshops were attended by a variety of university community members ranging from administrators (including the university president and several VPs) to staff accountants and others, faculty members from different academic areas, and students (including first semester freshmen), along with some members of the public. Most if not all left the 90-minute workshops not only with a general introduction to blockchain, but with added, computer coding skills necessary to understand, in a nontrivial way, the 'backend' of one important blockchain (the Ethereum blockchain). If the needs of the workforce, and accurate awareness by the broader generally educated public, are not addressed by colleges and universities, the relevancy and currency of current accounting and business curricula will be in doubt. In the remainder of this introduction, we address other reasons why an article on blockchain is likely to be of timely interest for academic faculty, then describe the sections of the paper.

1. A growing number of companies are involved with blockchain, from small start-ups to established corporations. The following list highlights several examples of NASDAQ, NYSE or foreign market listed companies that are prioritizing the technology in a nontrivial way, implementing it in a facet of their work or substantively examining it as a means to improve their business in the future: IBM, Microsoft, Oracle, Intel, Anheuser-Busch, Daimler, Walmart, Goldman Sachs, Alibaba, JP Morgan, Ernst and Young.

2. The integration of blockchain education into the curricula of universities not only benefits those who seek to work in or with the business sector, but also enhances the relevance of educational institutions as they strive to remain relevant (and even visionary). AACSB International (AACSB) recently approved its new 2020 accreditation standards effective July 28, 2020 (AACSB, 2020). One of the AACSB Standards is standard 4: Curriculum. Standard 4 indicates that 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. In the Basis for Judgment section, 4.3 indicates that the school has an innovative approach that generates currency, creativity, and forward-thinking. Cory Ng, professor on instruction in accounting at the Fox School of Business at Temple University, has stated (Ng, 2019) "[Blockchain technology] is considered one of the most significant advances in record keeping since double-entry bookkeeping emerged in Italy in the 15th century…Blockchain has the potential to revolutionize business processes and accounting practice. Educators cannot be left behind. Effectively introducing Blockchain into the curriculum will ensure that accounting education maintains relevancy and prepares student for the future". (See also Alarcon & Ng, 2018, and Kursh & Gold, 2016.) This paper has developed a response to the considerations of currency, creativity, and forward-thinking in the accounting curriculum by proposing to add blockchain technology workshops in the accounting curriculum.

The outline of this paper is as follows. Much of our initial activity focused on a narrow use-case for blockchain, concerning shareholder-related issues of share ownership and related voting issues in corporate governance. This is addressed in some detail in section 2, as it is likely of independent interest since we soon realized the issues of concern were not widely known among the public. Next, in section 3, we summarize the result of various 30 to 60 minute phone conversations with Colorado state government officials and legislators and others about the use of blockchain technology in state government's daily regulatory activities. What we discovered was that although interest in using blockchain prevailed among those we spoke with, the actual level of technical understanding of blockchain was not as detailed as we had initially assumed. As described in section 4, the researchers then decided to offer hands-on active-participant blockchain workshops, where, after a general lecture-format overview, the main focus was coding and immediate implementation, so that participants could experience what is possible and what is necessary for the implementation of blockchain in business, government, and beyond. The hands-on aspect of the workshops is consistent with much educational research. For instance, experiential education (project-based coursework, labs, etc) provides numerous benefits, i.e. such specific learning experiences contribute to areas of growth including better understanding of the curriculum and enhanced research skills (Thiry et al., 2011). Similarly, recent research from Harvard University indicates that students learn more when active learning techniques are employed rather than when passive learning teaching methods, primarily lecturing, were used (even though participants might not initially perceive this to be the case) (Deslauriers et al., 2019). After reading this article, readers and/or their students who are interested in further details about how various blockchains work can benefit from recent books such as (Antonopoulous & Wood, 2019), (Werbach, 2018), (Narayanan et al., 2016). Those with an interest in further details regarding the software, in the ongoing evolution of open source entities such as Ethereum, Solidity and Hyperledger (discussed primarily in section 4 below), would benefit from the valuable documentation and other materials available at the websites given in the references for these: (Ethereum community, n.d.), (Ethereum.org, n.d.), (Ethereum Revision 27df1765, n.d.), (Hyperledger, n.d.). (And github is an important repository for the ongoing development of many aspects of blockchain.)

The research team consisted of a Professor of Accounting, a Professor of Mathematics, and three student researchers whose college disciplines ranged from Accounting, to History-Pre-Law, to Political Science. The student researchers were not familiar with blockchain initially, but still were able to participate in telephone interviews with business persons and governmental officials that involved blockchain in some way. The three student researchers were paid from the project's university-provided Cyber Security/Blockchain Grant [which in turn was provided by legislation from the state of Colorado under SB18-086 (Cyber Coding Cryptology for State Records, 2018)].

INITIAL QUESTION AND METHODOLOGY (WHAT WE WANTED TO EXPLORE)

Prior to the start of the project, the two faculty leads believed that in order to lead to significant adoption (or 'buy-in'), novel technological applications must have meaning to a wide audience. Thus, an important pedagogical component of the research project was for it to be truly multi- and interdisciplinary, and involve a group of undergraduate students from a variety of academic disciplines. One coauthor had previously worked with a campus student and faculty research group on a fairly narrow technical computer code development of a blockchain (primarily based on IBM's Hyperledger Fabric). By contrast, for this project we sought students with interests outside computer science related applications, and a particular use-case sufficiently narrow in focus, that could meaningfully be addressed during a single semester. We initially settled on: Can blockchains be effective in supporting and facilitating corporate governance, including utilizing shareholder ledger technology for corporate voting? This use-case had appeal in part because it addressed issues of secure, blockchain-based electronic voting, something of much wider interest. Below we provide some detail regarding this problem because it is not widely known to the public and more specifically not widely known to business students and faculty, and it provides a potential nontrivial use case for blockchain.

Background to the Initial Question

The Depository and Clearing Corporation (DTCC) is an example of a company providing vital services involving trillions of dollars a day (i.e. quadrillions of dollars a year) that few people have ever heard of. Most recently, some may have heard of the DTCC from the time they addressed congressional inquiries about naked short selling, soon after the Great Recession. The DTCC is a financial services company founded in 1999 that provides clearing and settlement services for financial markets, and settles the vast majority of securities transactions in the US. At its inception it combined the functions of the Depository Trust Company (DTC, created in 1973) and the National Securities Clearing Corporation (NSCC, created in 1976), and below we focus on just these two subsidiaries. Prior to the creation of the DTC and NSCC, stock exchanges typically closed for a day each week to effect the processing of paper stock certificates; regular 'trading holidays' were required. Brokers typically closed for a day each week because of this inefficient process of physically exchanging certificates (which involved hiring people to carry certificates and checks). By the late 1960s, the New York Stock Exchange had difficulty managing trading volume on the order of 10 million shares per day - anecdotally, stock certificates would be piled up in offices often for weeks and stocks were mailed to incorrect addresses. In the 1970s the key changes made included that all paper stock certificates would be stored in centralized depositories to accomplish 'share immobilization' (typically in the form of 'jumbo certificates' representing thousands of individual shares); automating the process through electronic record keeping (leading to the creation of the DTC in New York City, now the only one of the centralized depositories to remain); and multilateral and centralized netting (rather than multiple individual sales with concomitant invoicing and payments) was proposed, leading to the creation of the NSCC. The NYSE now handles billions of trades each day; DTCC processes trillions of dollars of securities each day. As the centralized clearinghouse for over 50 exchanges and equity platforms, the DTCC settles transactions between buyers and sellers of securities and plays a key role in automating, centralizing, and streamlining financial markets.

With some oversimplifications, most of the largest broker-dealers and banks in the US are participants in the DTC (i.e. if they are registered owners of the securities, they deposit those securities at the DTC as fungible bulk, i.e. no one entity owns individual shares). For example, a particular Bank A might own a certain percentage x of the shares of stock of company C held at the DTC. The DTC holds more than 1 million securities (e.g. corporate stocks and bonds, municipal bonds, money market instruments), valued at over $50 trillion, issued in the US and over 110 countries (as of 2017). The DTC is a subsidiary of the DTCC. It holds these assets, and the assets are actually issued to their 'nominee' CEDE and Company, a subsidiary of the DTC. DTC holds legal title to the securities, and an ultimate investor is known as the 'beneficial owner'; but only the broker's name is kept in DTC's ownership records. (Caveats to the above descriptions include that the above description is for DTC-eligible securities that are held in 'street name'; DTC allows for two other, more expensive and higher risk options, namely 'direct registration' and 'physical certificate'). Note that the DTC is owned by many companies in the financial industry, including the NYSE. Individuals don't interact with the DTC; rather brokers, dealers, institutional investors, depository institutions, issuing and paying agents, and settling banks do. Among services other than safekeeping and clearing, the DTC provides underwriting and dividend services. (E.g. when a company declares a dividend, DTC announces it and then collects the dividend payment from the company and allocates dividend payment to the shareholders and reports those payments.) DTC has over 700 participant accounts listed as of May 2020 (https://www.dtcc.com/client-center/dtc-directories) and for illustrative purposes participants include Goldman Sachs & CO LLC, Morgan Stanley Smith Barney LLC, Deutsche Bank Securities Inc. - Stock Loan, JP Morgan

Chase Bank - ADR, Citibank N.A. - Dealer, UBS AG, Stamford Branch, The Bank of New York Mellon, Bank of China New York Branch, Japan Securities Depository Center, Inc., etc. When an investor places a buy/sell order through their broker, and the trade is made between the broker and another broker, the trade information is sent to the NSCC for clearing. After the NSCC processes and records the trade, they report to the brokers involved, specifying the net securities positions after the trade and money due to be settled between the parties. The NSCC provides settlement instructions to the DTCC, which transfers ownership of the securities from the selling broker account to the account of the broker who made the purchase. The DTCC also transfers funds from the buying broker's account to the seller's account and in so doing is involved in managing cash and securities or futures contracts (and for this service it exacts a fee). The broker internally makes adjustments in their client's accounts, typically on the day of the transaction.

While this federal approach helped mitigate many issues of stock trading immeasurably, corporate state law typically is not directly harmonious with the CEDE-nominated approach. For instance, Delaware corporate law assumes on the one hand that an individual owns specific shares, but on the other hand (through state adoption of key provisions of the Uniform Commercial Code) it assumes individuals own shares in fungible bulk. As a concrete example of how these issues occasionally become manifested in the courts, appraisal litigation occurred following Michael Dell's management-led buyout. In Delaware, if a stockholder seeks appraisal (i.e. a judicially determined fair value) prior to a proposed merger, then the 'record holder' must continuously hold the shares through the effective date of the merger. Several shareholders sought appraisal, notified the DTC since CEDE was the 'record holder', and ordinarily CEDE would have issued certificates in their name to the beneficial holders (the banks) so that the 'record holder' would not change. However, some banks had policies prohibiting their holding shares issued in the name of others (like CEDE). So CEDE reissued the shares in the name of an entity acceptable to the banks (essentially in their name) and that broke the record holder continuity requirement in Delaware law; thus, the shareholders lost standing in their lawsuit. The presiding judge who made that ruling, Vice Chancellor of the Delaware Court of Chancery Travis Laster, described this [in a document that formed the basis for his keynote speech to the Council of Institutional Investors (Laster, 2016)], stating "Personally, I think that is absurd," noting that the shareholders lost a potential for higher appraisal price and moreover lost access to their stock (capital), without interest, for the two years before he was able to make his ruling; but he felt he had no choice.

In addition, the same Dell case led to an issue involving shareholder voting: to pursue appraisal under Delaware law, the stockholder must have not voted in favor of the merger. T. Rowe Price was the beneficial owner of several million shares (and CEDE was the record holder). Under Delaware law, a record holder is the party allowed to vote. But under federal securities law, beneficial owners must direct how shares are voted. To get T. Rowe Price's voting instructions, the DTC had to transfer its state law voting authority to T. Rowe Price's 'participant' (State Street); the latter then outsourced the task of collecting and implementing voting instructions; and T. Rowe Price had an additional party assist in passing on those voting instructions. While T. Rowe Price correctly transmitted the intended vote on several occasions, due to a meeting adjournment the other party inadvertently sent what was T. Rowe Price's automatic/default response under such circumstances (i.e. what they finally transmitted, even though they had previously stated the voting intent). Laster (Laster, 2016) notes that other issues tied to such settlement complexity include overvoting and other voting issues (e.g. in a 2008 vote at Yahoo! for control of the board, millions of votes were misattributed, almost 20% of all votes, which fortuitously in that case did not affect the outcome but was nevertheless a very large error). Noting that “Because ...ownership of individual shares ... is not tracked in the US clearance and settlement system [due to the use of fungible bulk], imbalances occur... and broker-dealers must decide which customers will be permitted to vote and how many shares each customer will be permitted to vote”, Laster cites an estimate that whenever a vote is closer than 55% to 45%, there is no verifiable way to ascertain - who won? Legal standing issues as noted above, and other issues [such as shareholder liability for fraud (misrepresentation)], often require tracing - who is or isn't a shareholder - i.e. the lack of shareholder tracing has genuine, important implications in corporate law.

Given this context, this motivates the initial question, restated from above: Can blockchains be effective in supporting and facilitating corporate governance, including utilizing shareholder ledger technology for corporate voting? This was our initial research question, which led to the results described in the remainder of this article.

Initial Results/Outcomes

Selection of Interviewees and Conferences for Research

With this original research question as described in the previous section, the undergraduate students coordinated with university library staff to research scholarly articles on blockchain and its relationship to corporate shareholder

issues. However, there were limited number of articles in scholarly journals about blockchain and corporate governance, beyond some law review articles. One such article was authored by Professor George Geis, University of Virginia Law School (Geis, 2018); we obtained an early interview with him about blockchain distributed ledger use in public company stock trading transactions. The student researchers were also assigned to identify all recent blockchain related acts or bills that were passed by or introduced to the legislative bodies of the State of Colorado. Upon presenting their findings to the entire group of researchers, we would, as a group, select names of those who signed the bill as sponsors or co-sponsors to contact. Either a faculty or a student researcher would make initial contact based upon who knew or had some contact with the selected Colorado state senators and representatives. From our conversations with selected government officials, we solicited additional names and introductory email identifying our research project and purpose as we pursued various 'leads' as to who knew what and was doing what regarding blockchain. The introductory email allowed us entry to offices of several government officials, most of whom gave us phone interviews.

Student researchers participated in obtaining the contact information of potential candidates for an interview about their experiences in blockchain applications. In addition, the students sent communications (sometimes email followed up by phone calls) to government officials of foreign countries (e.g. Estonia) to obtain information. We also communicated with members, and reviewed the reports, of The Colorado Council for the Advancement of Blockchain Use that provide information of where Colorado governmental officials were in their discussions about implementing blockchain in its agencies and departments.

In addition, the student researchers were required to provide a reflection report on their experience and recap what they learned and how their findings would contribute to the purpose of the research project. These summary reports on their research effort gave the perspective from students' viewpoints, which were very helpful to the overall assessment of the research results. The following list represents the individuals that we interviewed during the first six months of 2019:
--Former Colorado State Senator Kent Lambert, prime sponsor of Colorado S.B. 18-086 (Cyber Coding Cryptology for State Records, 2018)
--Trace Ridpath (Director of IT Governance and Security, Colorado Office of Information Technology)
--Professor George Geis, University of Virginia Law School
--Thad Batt (Colorado's Blockchain Solutions Architect in the Office of Information Technology)
--Trevor Timmons (CIO, Colorado Department of State)
--Jeff Eaby, attorney and chief examiner, Colorado Department of Regulatory Affairs
--State Senator Jack Tate, prime cosponsor of Colorado S.B. 19-023 (Cryptocurrency Exemption Colorado Digital Token Act, 2019)
--State Senator Stephen Fenberg, prime cosponsor of Colorado S.B. 19-023 (Cryptocurrency Exemption Colorado Digital Token Act, 2019)
--Brian Van Sickle (IT director for the Colorado Department of Personnel and Administration)
--Jana Persky (Colorado Office of Economic Development and International Trade, who directed the Colorado Blockchain Alliance meetings)
--Also virtually attended Securities and Exchange Commission Fintech forum (Securities and Exchange Commission, 2019b) (all-day webinar, May 31, 2019)

Although we did not have a phone interview with Colorado House Representative Donald Valdez, one of the faculty researchers had personal conversations with him about blockchain, and he also participated in one of our blockchain workshops. Representative Valdez serves on the House Agriculture, Livestock, & Natural Resources Committee and the House Local Government Committee and was a cosponsor of one agriculture-related blockchain bill, Colorado H.B. 19-1247 (Study Agricultural Applications for Blockchain, 2019) and maintains an interest in blockchain and agriculture supply chains, including for small local producers.

Findings Obtained from Contacts in the Field
What the team learned from these spring 2019 contacts included the following:
1. The government of the state of Colorado was widely interested in blockchain applications – both the previous administration, and the current administration (elected into office in fall 2018).
2. The Colorado government was not addressing the use-case we first envisioned, i.e. shareholder-related issues were not a use-case that had attracted the attention of those we spoke with.
3. Colorado government officials were aware of some of what other states were doing regarding blockchain initiatives (e.g. Wyoming's many inroads, and West Virginia's voting experiments) and perceived that Colorado, as

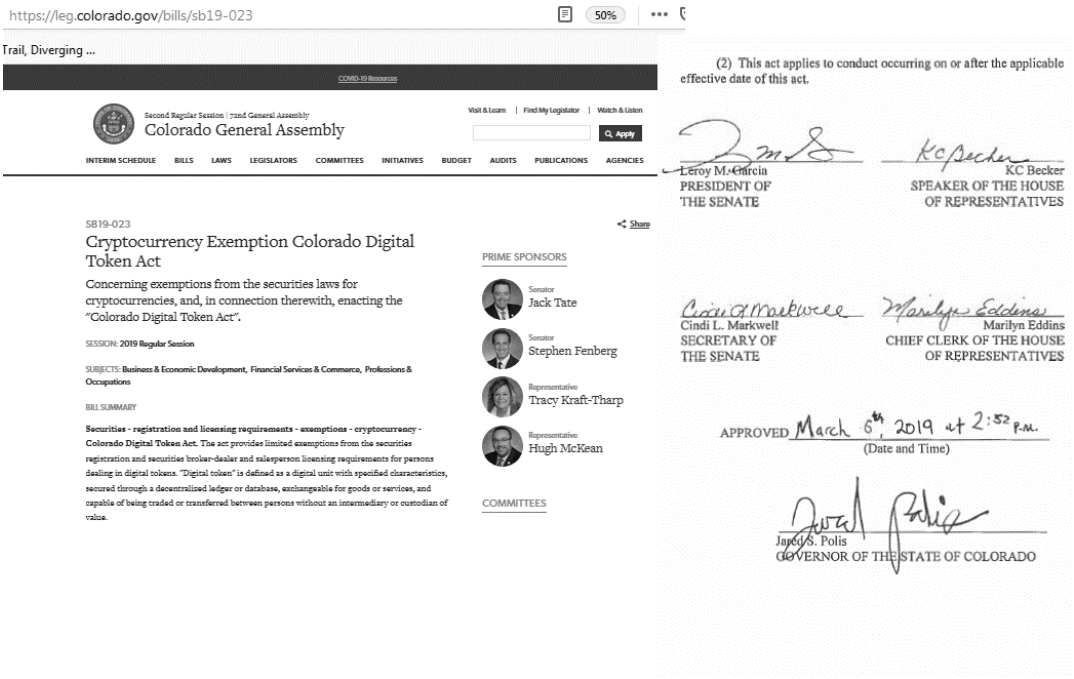
a state, was somewhat ahead of most other states in adopting blockchain technology (although they did not perceive that they were leading the nation, per se.
4. Denver, Colorado, offered a blockchain-based option to its municipal election held on May 7, 2019, with 119 military and overseas voters who used their cell phone on the Voatz platform (that had assisted West Virginia in statewide voting for certain subpopulations, in May and November 2018). The Secretary of State in Colorado manages statewide (including federal) elections, and had communicated with the Voatz team, but for technical reasons were not proceeding with their platform. Nevertheless, they were interested in the experiment conducted by the city of Denver – state law permits certain cities (depending on charter) to manage their own municipal elections. (As an aside, note that WV decided in May 2020 to not go forward with the Voatz mobile app in 2020 due to security concerns.)
5. The Colorado Department of Regulatory Affairs (DORA) regulates banks, financial institutions (e.g. credit unions), securities (i.e. securities must register through DORA), and occupational licensing (e.g. accounting firms, physicians). The bulk of Colorado government interests were (as of spring 2019) primarily related to digital tokens, either as vehicles to raise money (as in initial coin offerings, and potentially to be treated as securities) or as utility tokens. Other ideas were being explored (e.g. keeping track of licensing/credentialing of the approximately 500,000 professionals overseen by DORA – this does not include educator credentialing) in the state via blockchain, or keeping track of student educational credentials particularly for higher education), but seemed in early stages. Familiarity with background details about blockchain was highly varied; some had only a basic summary perspective.

Interviewees seemed genuinely interested in the suggestion of a conference, with hands-on workshops, either for themselves or for those that report to them, or both. We also noted much activity at the federal, national, level, as described in the Security Exchange Commission's May 31, 2019 FinTech conference which was viewed by both students and the two faculty researchers. Overall, the tone was supportive of financial innovation that distributed ledgers such as blockchain could bring, including potential cost-reduction and efficiency, and enabling individuals and businesses to tap into other funding sources besides venture capital, with much caution regarding regulation. A primary focus concerned how to verify compliance with securities laws, e.g. disclosure issues for issuance of digital asset securities – what would be the analog of price/earnings ratio, and what would be the analog of the SEC's plain-English-rule, in issuance? Other issues regarding digital asset securities include anti-money laundering (AML) and know-your-customer (KYC) statutory requirements for securities, and related requirements for licensing money services business (MSB) including money transmitters, including those that have international scope. Who would have custody of cryptocurrency assets – what is the nature of (qualified) custodians in this digital asset environment, including what implications are there for foreign custodians and transmitter issues internationally, and even interstate? Other issues raised at the SEC conference included the use of blockchain-based assets for collateral (in part given the high volatility of recent years in cryptocurrencies) – stable coins (cryptocurrencies attempting to tie their value to fiat currencies like the US dollar) might be able to help. Various blockchains house different cryptocurrencies and other entities (e.g. the Ethereum blockchain has many smart contracts); atomic swaps might help address interoperability issues. (Atomic swaps are a mechanism to swap cryptocurrency tokens, i.e. a way to swap some cryptocurrencies running on one blockchain with different cryptocurrencies on another blockchain, that minimize the need to trust other parties and intermediaries, and thus resort to intricate time-sensitive queries between the parties.) Finally, the SEC raised issues regarding SOC1 and SOC2 audits, as follows. Per American Institute of Certified Public Accountants (AICPA) requirements, service organizations (i.e. third-party organizations providing services) must have adequate internal controls in regards to financial reporting and in regards to security, availability, processing integrity, confidentiality, and privacy of customer data. Service Organizations' Controls (SOC) are expected to have audits conducted by certified public accountants (CPAs) to assess their compliance with acceptable internal controls compliance standards. These audits are referred to as SOC1, SOC2 and SOC3 audits. SOC1 audits are concerned with the service organizations' internal controls related to its financial reporting. SOC2 and SOC3 are both designed to access the internal controls that assure security, availability, processing integrity, confidentiality, and privacy of customer data. The main difference between SOC2 and SOC3 is the audience to whom the reports are addressed—SOC2 audit reports are addressed to service organizations themselves and SOC3 audit reports are addressed to the general public. Such reports would likely appear in the service organizations' annual reports with a seal to indicate compliance to established guidelines. Pursuant to the Investment Advisers Act of 1940: Rule 206(4)-2, on March 12 2019, the SEC issued a letter (Securities and Exchange Commission, 2019) to Karen Barr, President and CEO of the Investment Adviser Association with the heading "Engaging on Non-DVP Custodial Practices and Digital Assets", in part addressing investment adviser and custodial trading practices that are not settled or processed on a "delivery vs payment basis" (i.e. non-DVP). The SEC sought suggestions concerning the application of the SEC's Custody Rule to digital assets, in part specifically asking "What role do internal control

reports, such as System and Organization Controls (SOC) 1 and SOC 2 reports (Type 1 and 2), play in an adviser's evaluation of potential digital asset custodians? What role should they play?" And in addition, considering the security features of blockchains, it would appear that service organizations that utilize blockchain could readily meet the internal control requirements of SOC1, SOC2 and SOC3 provided the blockchains allow for auditor access (i.e. this would need to be addressed in the private/permissioned blockchains).

Another concern was new developments such as airdrops, which are almost coupon-like cryptocurrencies added to cryptocurrency or token participant/user accounts – how should these be monitored, recorded and otherwise addressed with regard to securities laws? And regarding smart contracts somewhat philosophically, what is the true legally binding component: the computer code, or a human-readable contract? A legally enforceable smart contract must meet all the elements of a binding paper contract. Importantly, a contract between a natural person and an 'electronic agent', which would be an automated system, is enforceable if all the other contractual elements are present. One must nevertheless carefully consider whether smart contracts are legally binding contracts. The legality of smart contracts depends on the form of each smart contract taking into consideration US and state contract law.

Figure 1: One Recent Blockchain-Related Law Passed in Colorado



We conclude this section with one piece of legislation sponsored by two of the individuals interviewed for this project. The screencapture in Figure 1 displays a recent Colorado example of blockchain legislation. One of two bills signed into law in the 2019 legislative session was the S. B. 19-023 (Cryptocurrency Exemption Colorado Digital Token Act, 2019), with prime cosponsors Senators Jack Tate and Stephen Fenberg (along with two state representatives). Digital tokens might have value as a cryptocurrency (like Bitcoin or Ether), but they might also have value as what is sometimes referred to as a utility token. As an aside, for context, imprecise terminology often encountered includes 'utility tokens' and 'equity tokens'; utility tokens roughly refer to digital tokens required for accessing a service or resource (e.g. shared storage); by contrast, equity tokens roughly refer to tokens akin to digital shares (voting or nonvoting) in a startup. For the purposes of the Colorado legislation, the definition of digital token specifically mentions that they are created by deploying computer code to a blockchain network; recorded in a digital ledger that is chronological, consensus-based, decentralized, and mathematically verified; and are capable of being traded or transferred without an intermediary. The bill addresses that digital tokens are for what they refer to as 'consumptive purposes' – where the tokens are used in exchange for something (e.g. the token may be used to provide or receive goods or services or content). More specifically, the act states that so long as the issuer of the digital token notifies the Securities Commissioner; the digital token is primarily intended for consumptive use and is marketed that way (i.e. the token is not for speculative or investment purposes); and the consumptive use is immediately available at time of sale*; then for the purposes of the state of Colorado, the token is exempt from

Colorado securities law registration provisions (CO Rev Stat section 11-51-301). Note that this does not mean that the token is not subject to federal securities law. Whether or not a digital token is viewed as a security for federal purposes is typically determined by what is known as the Howey Test (based on a 1946 case decided by the US Supreme Court, Securities and Exchange Commission v. W. J. Howey Co., 328 U.S. 293). This test stipulates that a transaction is an 'investment contract' (essentially a security, subject to registration including various disclosures to the SEC) if it is an investment of money or other assets; there is an expectation of profits from the investment; the investment of money is in a common enterprise; and any profit comes from the efforts of a promoter or third party. In the digital token context, the issues are whether the purchasers are participating in a speculative enterprise, and if so, if the profits those purchasers are hoping for are entirely dependent upon the work of a third party. Currently, both Colorado and the Securities and Exchange Commission adopts this Howey Test standard. (*If the consumptive purpose is not available at time of sale, then the same exemption holds if the following are satisfied: the consumptive use will be available within 180 days, the initial buyer can't resell prior to when the consumptive use becomes available, and the original buyer states that they intended their purchase to primarily be for their own consumptive use (and not for investment or speculative purposes).)

INTERACTIVE WORKSHOPS

The interactive workshops began with a general introductory lecture on blockchain prerequisites, then moved to hands-on coding.

What is Blockchain?

For the purposes of this article, a blockchain is a special type of distributed ledger system, which effectively distributes trust so that it is shared among participants in the system through the use of hash pointers – and we briefly explain these terms now. A distributed ledger is a sequential database (i.e. the order of the entries in the database matters), shared across a network of users. It is distributed in a decentralized sense, in that there is no one central authority that is fully in control of editing the database; there is one logical ledger, but many copies of the ledger, and in this way trust is shared among the network participants. Hash pointers form a key component of the blockchain – not only do entries in the ledger point to other components of the ledger, they also include cryptographic hashes of the information they point to, insuring confidence in the information that is stored, in particular that it has not been tampered with (more details on hashes are included below; for the moment, a hash of a set of data can be viewed as akin to a succinct digital fingerprint, practically speaking, unique to that data set). Participants in the network have their own copy of the ledger, and are able to independently examine and verify all transactions from the inception of the blockchain. This allows independent verification of ownership rights associated with the "assets", whatever form they may take – "assets" might be currency, digital tokens for services or commodities, or more abstract entities such as voting privileges, or more tangible quantities such as real or personal property. Most economic entities currently use double entry bookkeeping ledgers to track the disposition of their assets; such traditional ledgers are both private and fragmented, containing information related to the specific assets that each entity (individual or firm) owns. As one author notes (Geis, 2018), "Distributed ledgers are more akin to government managed real property registration systems, where anyone might examine current and historical ownership claims on a given parcel of property. But while public property records are typically centralized and housed in a single location, with limited accessibility, a distributed ledger can be split into hundreds or thousands of identical copies and situated in the scattered computer systems of individual members or users."

The data stored in a blockchain mostly consist of various transactions regarding the assets of interest, along with information about the overall current state of the entire system; these transactions change the state of the system, and by following all transactions as recorded on the blockchain any participant can recreate the current state of the system. Each transaction typically consists of (digitally signed) activity that includes a timestamp; when sufficiently many transactions are verified as legitimate, they are assembled into a 'block' (e.g. perhaps 1000 transactions between entities are recorded in a typical block of the bitcoin blockchain); different types of blockchains accomplish this verification and assembly in different ways. Crucially, blocks also include the digital hash (succinct digital 'fingerprint') of the previous block; in this way, blocks that have been added to the blockchain in the past cannot be tampered with, since that would alter the hash of not only such an earlier block but all subsequent blocks would have incorrect hashes pointing to the previous blocks, and thus the chain of blocks would not pass the digital verification step that any participant can undertake. In this way, a blockchain is viewed as incorporating transactions in a permanent, 'immutable' way.

Perhaps the most famous blockchain is the blockchain supporting the cryptocurrency Bitcoin, in existence since

2009. However, our interest is in blockchains used for a wider set of applications, in particular blockchains that support computer code known as 'smart contracts' created by participants that can execute transactions on the blockchain. Several open source platforms support such blockchains. Most prominently is the Ethereum blockchain, a public blockchain (where essentially anyone can become a participant and verify the blockchain's transactions and states), initially formulated in late 2013 and early 2014, and fully launched in mid-2015. In addition, there are important permissioned or private blockchain architectures (which restrict who can join the network; how consensus is achieved; and who can read, write, or audit/view various parts of the blockchain), most prominently the Hyperledger project (launched in conjunction with the Linux Foundation early in 2016), and in particular IBM's contribution known as Hyperledger Fabric. Other blockchain platforms of some renown include R3's Corda blockchain and JP Morgan's Quorum blockchain (which actually runs as a software 'fork' of the Ethereum blockchain, and in particular uses the same programming language as Ethereum, called "Solidity" – by its relation to Ethereum, it can take advantage of the large number of developers working on Ethereum). The workshops we conducted focused on Ethereum.

Blockchain Ingredients

Prerequisites for Proceeding with the Hands-On Component

There are several main ingredients in current blockchains. First, cryptography is ubiquitous in these systems – specifically public key cryptography (e.g. elliptic curve cryptography, digital signatures) along with various protocols (e.g. zero knowledge proofs, atomic swaps) and hashing (e.g. SHA256, keccak). Second, data structures and computational environments play an important role in keeping track of transactions and the state of the blockchain (via constructs such as Merkle trees – illustrated below – as well as Patricia Merkle trees, components of the Ethereum virtual machine). Third, consensus or trust models are vital to all blockchains (e.g. proof of work or proof of stake for public blockchains such as the Bitcoin blockchain and Ethereum, Raft and Istanbul Byzantine Fault Tolerance for some of the permissioned or private blockchains such as Hyperledger Fabric and Quorum, as well as consensus algorithms developed by companies such as Stellar and known as the Stellar consensus protocol). Fourth, data storage plays an important role (e.g. the Interplanetary File System or IPFS). And lastly, tools for software development have been created specifically for various blockchains (e.g. truffle, various test networks for the Ethereum blockchain and Hyperledger). Due to space limitations only some of these will be described, in rough detail.

Hashing algorithms figure prominently in the blockchains we examined. For our purposes, a hashing algorithm takes any digital input, i.e. any sequence of zeroes and ones no matter the length, and produces an output consisting of a random-looking fixed number of zeroes and ones. SHA256 (where "SHA" refers to "secure-hash-algorithm") and keccak produce a string of 256 zeroes and ones, i.e. 256 bits, as output (and are ubiquitous in Ethereum, the Bitcoin blockchain, and Hyperledger Fabric). If we denote the digital input by I, then H(I) must be 256 bits, roughly 128 of which are zeroes and 128 of which are ones. If any single bit of the input is changed, call that new input I', then the output of the hashing algorithm H(I') produces a different, random-looking sequence of 256 zeroes and ones. Because of the randomness, not only would H(I') have about 128 zeroes and 128 ones, but about 128 of the values of H(I') should be the same as H(I) and about 128 would be different. Another important feature of these adopted hashing algorithms is the computational difficulty in inverting the result: given the output of a hash, it is essentially impossible in any realistic sense to determine a valid original input: i.e. if the output is any sequence of 256 bits (such as 01101….011), no one could determine what possible valid original input produced this hash (besides testing all possibilities, which would take too much computational time). Finally, often digital values are not reported as zeroes and ones, but rather are reported base 16 (and sometimes base 64). Base 16 numbering assigns a symbol 0, 1, 2, …9, a, b, c, …, f for every possible sequence of four zeroes and ones (a 'nibble', or half of a 'byte') as follows: 0000 is encoded as '0', 0001 as '1', …, 1001 as '9', 1010 as 'a', … and lastly 1111 as 'b'. Thus the SHA256 hash of the text *hello readers!* with no spaces before or after is obtained by first converting the text into digital form (typically via ASCII conversion), then that data is sent through the SHA256 hashing algorithm to yield a sequence of zeroes and ones that in base16 is represented as 0193ca2110e8b5bd310cec8313bc20282062c6fc6ae5deca8224be06bb9ee4ce. By contrast, the SHA256 hash of the text *hello readers* (with no '!') is aa849d053a184d3d139626acd2c25a0ea61d470d1ce52fdefea2b79e28ab15b4. Note that the hashes look quite different. [As an aside, the use of hashes figures prominently not only in keeping track of data integrity, but also in the 'proof of work' done in Bitcoin 'mining'. Briefly, a set of valid Bitcoin transactions is added to the Bitcoin blockchain only when the hash of the transactions (along with some other required data) has a preset number of leading zeroes (e.g. over 70, of the 256 zeroes and ones). This unusual hash is extremely unlikely to occur, with probability less than $1/2^{70}$ or about .000 000 000 000 000 000 001, i.e. it is highly unlikely that a set of transactions will be allowed to be added to a block. Besides the transaction information

including timestamps, miners are allowed to incorporate a short segment of data consisting of special nonsense bits (a 'nonce') and run the hash of the proposed transactions with their somewhat randomly chosen nonce. Because any one hash will almost certainly not satisfy the leading zeroes requirement, it is only by repeatedly varying the allowed nonce that any miner will be successful. This difficulty is what leads to many computers running Bitcoin mining software, and specialized hardware, to compute thousands of hashes per second – achieving a valid hash, with the appropriate number of leading zeroes, is rewarded by the Bitcoin system, in that a successful miner will receive a set amount of Bitcoin. The reward amount is cut in half after 210,000 blocks have been added to the blockchain, which is approximately every four years; and in May 2020, the reward was last reset to 6.25 Bitcoin (each Bitcoin is currently valued at over $55,000). Transactions are added to the Bitcoin blockchain by miners at a relatively steady pace (roughly on the order of 1000 transactions every 10 minutes) by this balancing act: miners face a high level of difficulty in successfully satisfying the hash requirements to add a valid block of transactions, and relatively high reward if successful. Mining currently occurs in the Ethereum blockchain, albeit with different criteria than Bitcoin's approach; mining is not used in private/permissioned blockchains.]

Figure 2a: Snapshot of Cryptocurrencies from Coinbase Website

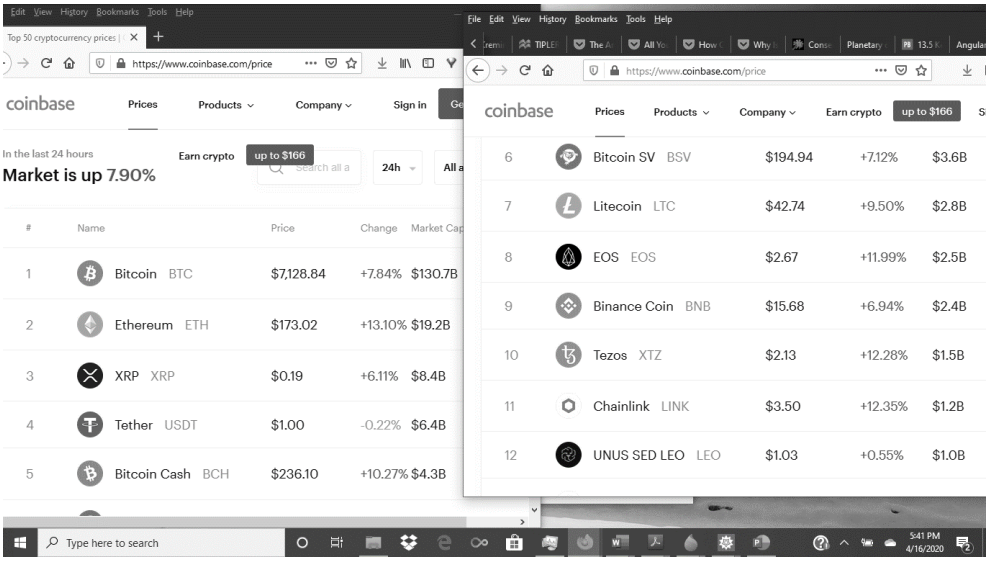
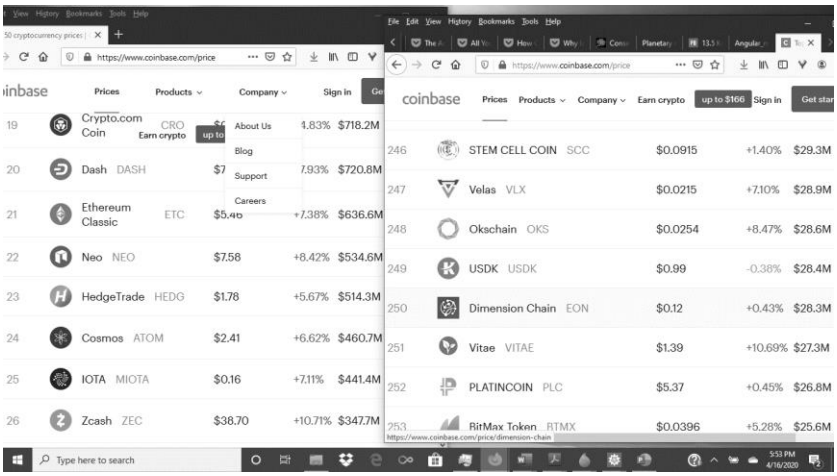


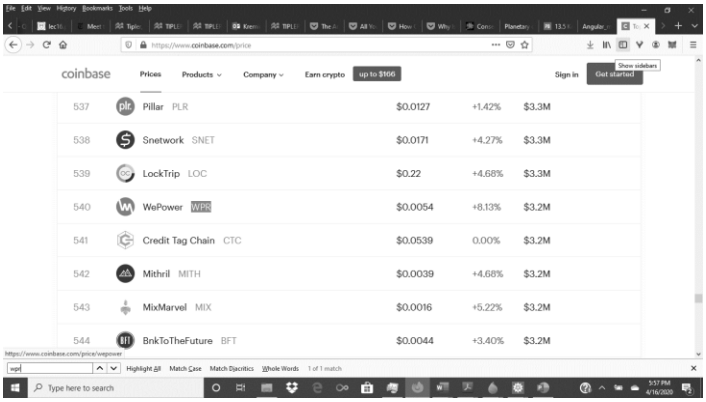
Figure 2 provides some screencaptures of a useful website for understanding cryptocurrencies. In Figure 2a, the Coinbase.com website shows the current price and overall market value of the several-dozen cryptocurrencies available for purchase to individuals with a Coinbase account, sorted by overall market value. Note that Bitcoin and Ethereum are the first two listed in a 2020 screencapture [with cryptocurrencies Bitcoin (BTC), and Ether (ETH) respectively; those screencaptures are from early 2020, and cryptocurrency prices continue to show significant volatility in that Bitcoin was over $11,000 and Ethereum over $400 in late August 2020; and over $58,000 and $2000 by early April 2021; combined BTC and ETH reached over $1.3 trillion in early April 2021]. Coinbase also indicates prices and market values of other cryptocurrencies - thousands more - that are not available for Coinbase transactions. Many cryptocurrencies are not issued on their own, separate blockchains, but rather are ERC20 tokens (named after Ethereum Request for Comments; the '20' refers to a GitHub issue number, and ERC20 tokens were first developed in late 2015); that is, many cryptocurrencies are actually smart contracts running on the Ethereum blockchain. ERC20 tokens are fungible, i.e. the tokens do not have unique identifiers (unlike ERC721 and ERC1155 tokens, which are nonfungible). One can explore ERC20 tokens at the Etherscan.io website, and compare with the Coinbase site. Both types of tokens are well known to securities regulators, both at the state level (e.g. in our conversations with the Colorado Department of Regulatory Affairs) and at the federal level (e.g. with the SEC's Fintech division, and often mentioned e.g. in the FinHub's public forum on distributed ledger technology and digital assets, May 31 2019).

Figure 2b: Snapshot of Other Cryptocurrencies from Coinbase Website



In figure 2b, the screencapture from coinbase.com includes mention of cryptocurrencies such as Zcash, where the "Z" refers to zero-knowledge-proofs, an important idea developed in mathematics and computer science that allows for confirmation that a certain individual has certain information, without revealing any aspect of that information. (For instance, zero-knowledge-proofs can be used to convince someone that an individual knows how to factor a large integer into two prime numbers without revealing the two primes, which is equivalent to confirming that someone has a certain cryptographic identity; or that an individual knows a password without revealing any information about the password; or that an individual has sufficient funds for a transaction, without revealing the amount of the transaction of the balance in their account.) Another cryptocurrency in the screencapture indicates that it was raising funds for stem cell research.

Figure 2c: Further Examples of Cryptocurrencies from Coinbase Website



In figure 2c, another cryptocurrency, visible in the coinbase.com screencapture, indicates that it was raising funds for a decentralized energy market. (Such markets might facilitate an individual selling power to another individual, e.g. an individual homeowner with solar panels might wish to sell available excess electricity to another individual.)

Figure 3a: Schematic of Information Storage in a Blockchain

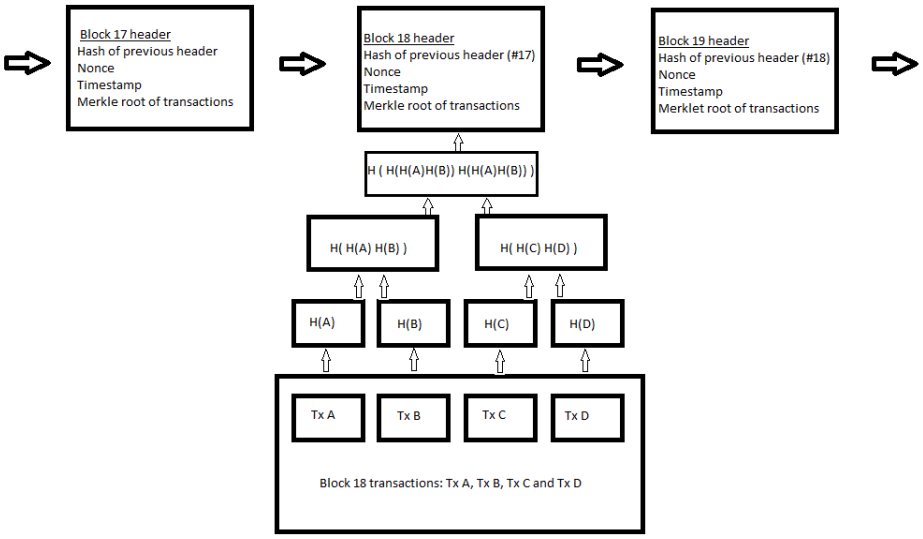


Figure 3b: Further Details of Information Stored in Ethereum Blockheader

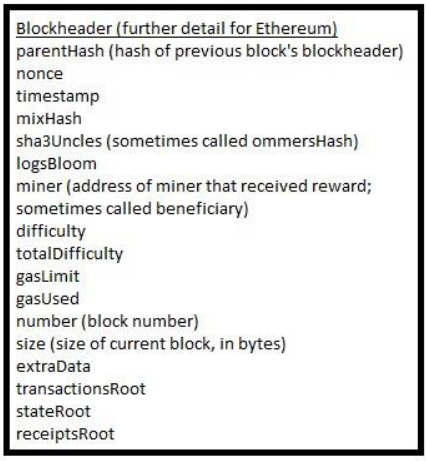


Figure 3 illustrates some further details to help understand the internal structure of a blockchain. In Figure 3a, the graphic provides a rough rendition of a section of a typical public blockchain and the importance of a Merkle tree, which is a tree consisting of hashes. (Other pieces of information are in the Ethereum blockheader, provided in the next figure; this graphic is for illustrative purposes). A Merkle tree is a way to efficiently store 'fingerprints' of data sets to help insure that data have not been corrupted or otherwise tampered with, and rely on the use of repeated hashing. If A, B, C and D represent four transactions that comprise all transactions in a simplified version of a block of a blockchain, and H(A) and so on represent the hashes of the transactions, respectively, then H(H(A) H(B)) denotes the hash of the string of zeroes and ones obtained by concatenating the hash of A and hash of B. That hash, along with H (H(C) H(D)) and others, are computed until finally H (H(H(A) H(B)) H (H(C) H(D))) is computed and called the Merkle root. If H represents a 256-bit hash (like SHA 256 or keccak), then at each stage the outputs, including the Merkle root, are all precisely 256 bits long. In Figure 3b, the Ethereum block header includes more information than noted in the previous figure, indicated in the graphic above. [See e.g. (Ethereum Improvement Proposal, n.d.).] Besides the transaction root from the Merkle tree of transactions associated with that block, there is a comparable root of a Merkle tree of receipts and a root of a Merkle tree of the entire state of the Ethereum

blockchain (the so-called World State), along with some other information such as the 'gas limit', the address of the miner/beneficiary who successfully added the block, information about blocks that aren't added to the blockchain yet were 'in the running' to be added (called uncles), and other information e.g. information related to another interesting data structure, a Bloom filter (to access a data log). Ethereum makes use of other powerful data structures such as a patricia tree (originally from Practical Algorithm to Retrieve Information Coded in Alphanumeric), which is a prefix tree that helps store trees efficiently, and typically uses a patricia Merkle tree (rather than just a Merkle tree). These trees are used to efficiently store information about the World State and transactions. The block of the blockchain includes information beyond just the block header, primarily including a (patricia Merkle) tree for the transactions for that block, and information about the 'uncle' blocks. [By contrast, the World State is not stored in the block, only the root hash of the World State, as stored separately in a (patricia Merkle) tree.] 'Uncle' blocks are a feature of Ethereum, but not of Bitcoin; they help encourage/incentivize miners to act quickly in attempting to successfully add blocks to the blockchain (Ethereum is able to add blocks much more quickly than Bitcoin, and miners are incentivized to add uncle blocks).

Figure 4a: Illustration of a Fork in a Blockchain

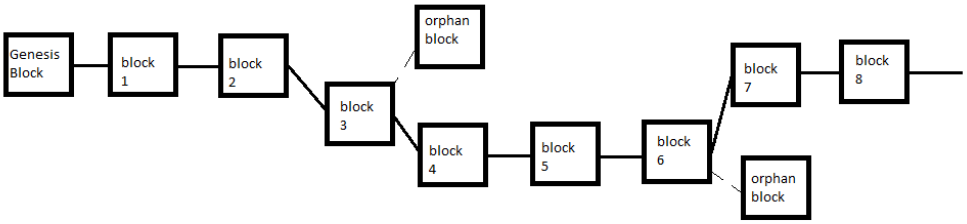


Figure 4b: Snapshot of Bitcoin Nodes on a Day in September 2020

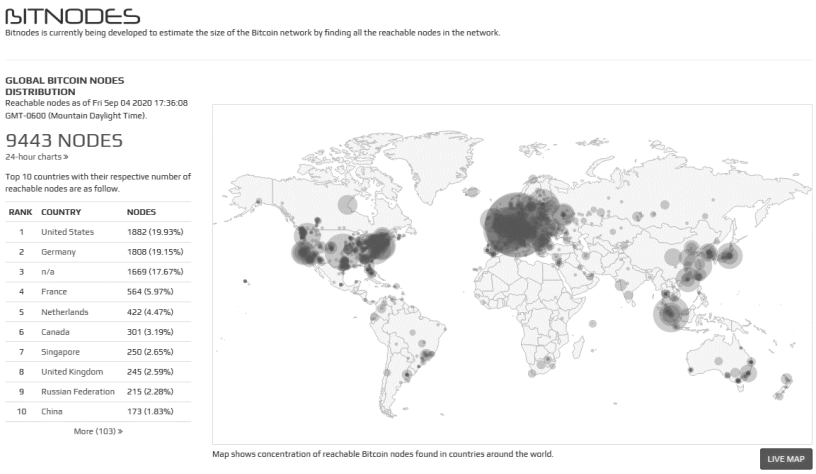


Figure 4 illustrates some more general components of blockchains: the diagram in (a) illustrates the structure of forks in a blockchain, while the map in (b) shows where Bitcoin nodes were located on a particular day (September 4 2020). A node is a computer that stores the entire Bitcoin blockchain, essentially verifying that all blocks, and all transactions, satisfy the correct hashing and cryptographic signature requirements – the nodes are precisely what makes the Bitcoin blockchain a distributed ledger.

Hands-On Component of the Interactive Workshops

For Student Researchers and Others, to See if Workshops Would Enhance Understanding of Blockchain

As noted in section 3, we found that many of those individuals that we spoke with did not have a particularized understanding of blockchain technology. This included some of those who are IT professionals – several agreed with the sentiment (which we believe is common among IT staff in state government) that they are professionally stretched very thin; they often do not have time to explore side issues, however interesting and potentially useful they might be, unless they receive a specific mandate and support resources. Essentially all contacts supported the

idea (some strongly) that a university such as ours host a conference, equipped with hands-on activities, so individuals could learn in a more technical, less superficial way what blockchain was all about. Not only did we realize that this level of detailed knowledge was missing and remedying the gap was of interest to the interviewees; the coauthors also felt that the student researchers would benefit from knowing more details, and the students agreed.

This led to our conducting several on-campus workshops, specifically targeting the same kind of multi-disciplinary background that we originally had sought in our student researchers. We invited administrators, faculty and staff, and students, including freshmen, to participate in 1-2 hour long workshops, with the only prerequisite being that they had at least heard the term 'Bitcoin' or 'blockhain', and were curious to know more. Overall, over 60 people attended at least one workshop (including at least one state legislator) [more specifically sessions included 4 administrators (dean and above); 4 recently graduated students; 29 mostly undergraduate students, including freshmen; 12 faculty; 10 staff; and 2 off-campus participants].

We summarize the structure of the workshops now, and go into more details in the figure captions. As most participants had at least heard the term 'Bitcoin' or 'blockhain' or both, the workshops began with an overview of the history of the development of Bitcoin as an important introduction to blockchain. We included some discussion of private/permissioned vs. public blockchains. The most technical component was a quick reminder about bits and bytes, and an introduction to the ideas of hashing (SHA-256 in particular). Overall, this initial portion of the workshops consisted of an interactive 'lecture' and provided the motivation for the next component: hands-on experience with the coding and implementation of 'smart contracts'. For the latter, we chose to proceed with the basics of coding for the Ethereum blockchain (with participants writing the smart contracts in the language Solidity, tested in the browser-based remix development environment at remix.ethereum.org; some workshops including setting up metamask wallets to interact with some of the contracts). For the first contract, all participants created a smart contract that implemented simple arithmetic functions and strings – we called this contract "helloandmore" to indicate it was more than just a 'hello world' listing of code. Next, participants explored at least one more contract: one or two digital token contracts, and/or a voting contract. Note that we purposefully chose not to proceed with having participants attempt to code for a permissioned blockchain such as Hyperledger Fabric – we did not see a way to meaningfully take a group that likely would include computer novices to the necessary level to write code for Hyperledger Fabric. (As an aside, we may add a Hyperledger Fabric component, as a demonstration that participants could follow along with in real time, after the hands-on portion for Ethereum. Hyperledger had previously supported a platform, Hyperledger Composer, that allowed developers access to a platform somewhat like the remix platform for Ethereum – but since summer 2019, Composer has been deprecated. As a result, it is currently significantly more time-consuming to have workshop participants directly write code for Hyperledger Fabric – exploring Fabric entails languages such as Go and/or formatting in JSON and/or installation on platforms such as Ubuntu/linux rather than Microsoft Windows, all issues readily addressed in short order but doing so would be unlikely to be successful, from start to finish, within 90 minutes.)

Once the workshops were completed, we were contacted by a group of undergraduate participants who were interested in learning more. This small student group continued, developing both backend coding (i.e. somewhat enhancing the demo Solidity smart contracts) and more significantly proceeding with front-end coding (Javascript, Webserver, HTML). Thus, after a few weeks, this group had created a website to interact with each smart contract. We emphasize that this latter group consisted of students with no prior experience with blockchain and thus none with Solidity, and all but one student had no prior experience with Javascript and Webserver details nor HTML.

Figure 5 depicts the workshop's first 'helloandmore.sol' contract, written in Solidity and housed in the remix development site. This site remix.ethereum.org includes a Javascript virtual machine option for the development/testing environment. When selected (as seen in the upper right), all workshop participants have the same development environment, namely a 'fake blockchain' with 'fake accounts' common to all those who visit the site, each containing 100 'fake' Ether. Each workshop participant initially sees 10 accounts with different addresses – but the same addresses are used for all remix participants, which is beneficial for workshops because each user can create identical simulations if they wish. (The addresses are actually sha-256 hashes of accounts.) Workshops spent at least 15 minutes on this first contract, beginning by explaining the Solidity code line by line, then exploring the remix compile tab including selecting the version of Solidity (specifically the compiler version) to use, then spending the majority of the time on the tab for run. For the latter, shown above, participants learned how to 'deploy' the contract to the blockchain, and how transactions proceeded. This overview of the smart contract mechanics explained how functions were accessed, including how input data are provided, and how some activity

required payment of 'gas' while other actions did not. Thus, this one example highlights key aspects of how smart contracts on the Ethereum blockchain work. The other contracts showed how the 'require' command in Solidity insures that only authorized users could effect certain changes (important in the issuance of digital tokens, and in voting), and how different accounts interact with each other. While more enhanced platforms exist for Ethereum development including the ganache blockchain, this environment was one that could be rapidly accessed so long as participants had access to a web browser.

Figure 5: Sample Smartcontract Written in Solidity for Ethereum Blockchain in Remix Environment

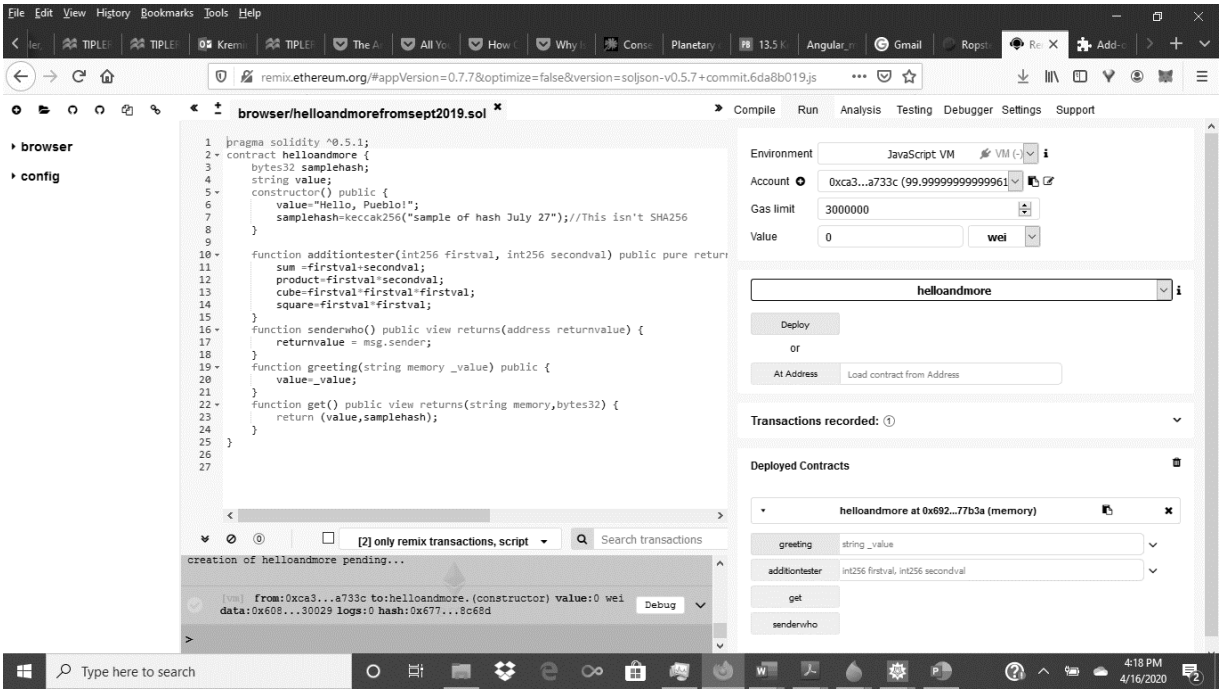


Figure 6 displays some of what the tool, Etherscan, can provide (along with a portion of a metamask wallet). In Figure 6a, the screen capture combines a display of Etherscan, a website that shows details of several blockchains associated with Ethereum including the Ropsten test network and the main Ethereum blockchain, along with a depiction of a metamask wallet. As noted in figure 5, workshops initially had participants explore the Javascript virtual machine blockchain, a simulated blockchain that only one user can explore. The Ropsten Test network is a genuine blockchain, which includes miners, with the caveat that it too uses 'fake' Ether (i.e. the Ether has no monetary cost). Figure 6b shows the countries that had active Ethereum nodes on a recent day (mid-September 2020).

Figure 6a: Screencapture of Portion of a Metamask Wallet, Along with Etherscan Website

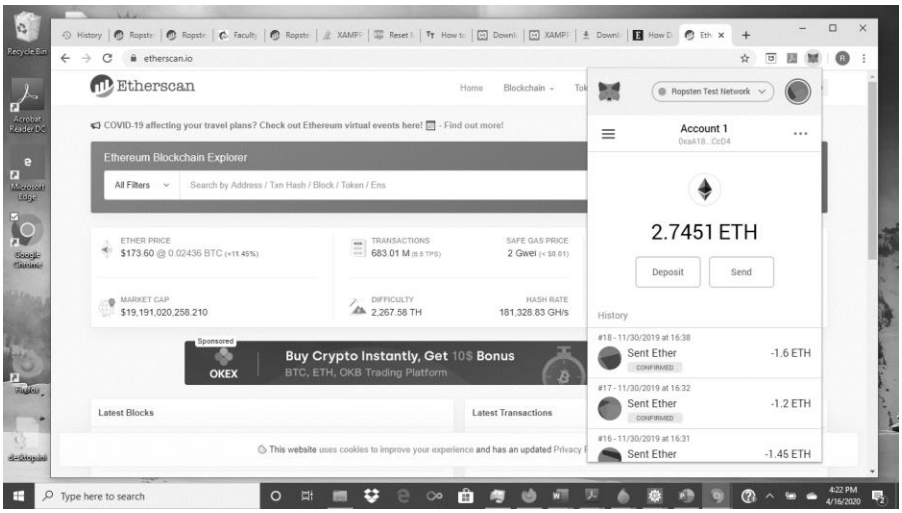
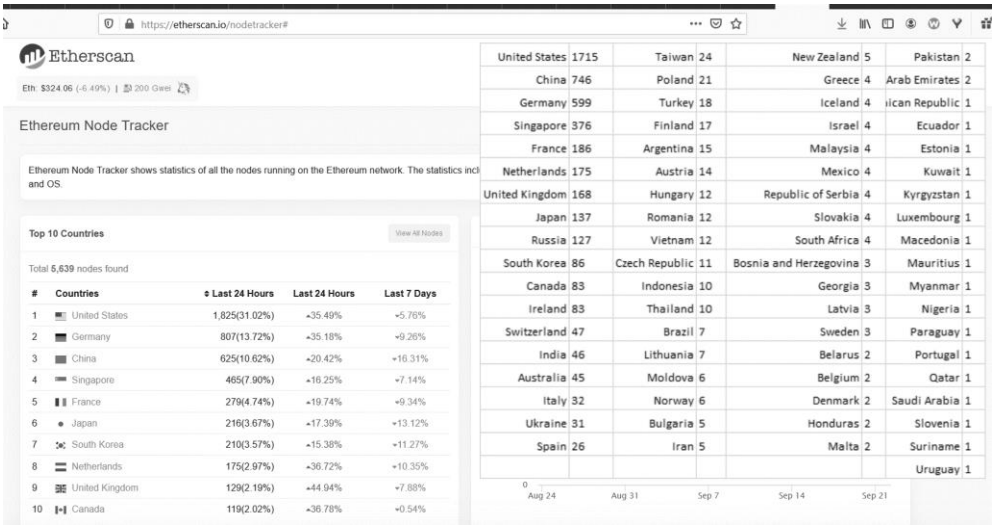


Figure 6b: Etherscan Website Displaying Nodes on Ethereum Network in September 2020



DISCUSSION/FUTURE APPLICATIONS

As noted in the sections above, this project began as a multidisciplinary team initially interested in one fairly narrow possible use-case for blockchain, namely a precise accounting for shareholder ownership and facilitation of shareholder voting that would satisfy government regulators. Besides the examples already cited about the need to streamline various processes for shareholder identity integrity, there are purely financial reasons to consider blockchain technology as well. [E.g., in notes to Travis Laster's keynote address to the Council of Institutional Investor on September 29, 2016 referenced above, he stated "Oliver Wyman and affiliates of Santander Bank estimate that there are $100 billion in annual post-trade and securities servicing fees. Issuers pay more than $200 million a year to communicate with stockholders alone, exclusive of printing and postage fees".] Leaving the domain of shareholder issues, the project evolved into exploring the then-current status of blockchain awareness primarily within a subset of Colorado government staff and legislators. This in turn led to a sense that individuals of all kinds – staff, students, faculty, university administrators – could benefit from some direct, hands-on experiences. The project thus concluded with conducting hands-on coding activities, so that, after preliminary 'lecture' material on blockchains with some generality, participants could interact directly with smart contracts in

the sense of the Ethereum public blockchain (and several of its test environments).

Due to the positive feedback we received from the workshops, we first explore how this type of activity – exposure via hands-on activity to genuinely new technological advances, in this case blockchain – could be incorporated in the undergraduate curriculum. We also explore other possible use-cases of blockchain that indicate areas for possible exploration in workshops, and might lead to student projects – today's students will likely be the ones affected most by advances in such technologies, including blockchain.

At Colorado State University Pueblo, a regional comprehensive institution serving over 10,000 students annually, with over 4,000 (primarily undergraduate) students engaged in face-to-face campus instruction in a typical fall semester, the business program enrolls approximately 20% of the undergraduate students by major, not including students seeking business minors or otherwise taking business courses. The program includes majors in accounting, business administration including marketing, economics and finance, and computer information systems. All business students (and some others on campus) currently are required to master a minimum technology competency of Mircrosoft packages (MS Word, Excel, Powerpoint), most often through taking three separate 100-level 1 credit hour courses. Based on this blockchain project, we would propose condensing the current requirements into two credit hours at the 100-level, and creating a new 200-level one credit hour course that would include exactly such technological advances. As this project focused on blockchain, initially we would include the Solidity coding for the Ethereum public blockchain; we would also explore hands-on activities with private permissioned blockchains such as IBM's Hyperledger Fabric, or JP Morgan's Ethereum (and thus Solidity)-based Quorum. We also have some experience and plans for artificial intelligence (including convolutional and recurrent neural networks) hands-on workshops. We envision this 200-level course as a requirement for business majors – however, we have had some discussions on campus for the need for such experiences for all undergraduates. Alternately, such workshops could be incorporated into other courses, e.g. BUSAD 360, Advanced Business Statistics, or ACCTG 202, Principles of Managerial Accounting – both required core courses for any business major. As noted in the introduction above, such activities specifically address AACSB standards/expectations. Adding Blockchain experiential workshops to the accounting and business curricula would not only enhance the professional engagement competency of accounting and business students but also would provide currency and relevancy to the curricula that would demonstrate having met AACSB Standard 4 (AACSB, 2020). Such additions help demonstrate a curriculum that is concerned with currency and relevancy; innovative business practices; learners helping each other; experiential involvement; competency; and addressing the betterment of society and positive societal impact. We stress that the (multidisciplinary) research team was able to gain significant (multidisciplinary) insight into how blockchain could be important in shaping our future world. The creation of similar workshops or curricula in other institutions could provide not only a needed educational service; it could be an avenue to original research as well.

WHAT DOES THE FUTURE HOLD FOR BLOCKCHAIN?

Other Possible Use-Cases

There are many possible use-cases for blockchain. The following list of examples came up in the course of the workshops and subsequent presentations, and is only for illustrative purposes.

1. Professional licensing: Credentialing, including required continuing professional development credits, is routine in professional areas such as accounting, law, education, various trades and in the medical field. It is important that professional organizations and/or government agencies document that those employed meet certain national and local standards to provide quality care or service. Credentialing also impacts accreditation as professional service providers. According to (Schnur, 2020) professional credentialing is complicated, expensive and tedious. Blockchain credentialing could save time and decrease cost.

2. Supply chains (equipment-related – PPE for COVID; food/ag-related; provenance): Supply chain management can be complex and requires the coordination of many individuals and entities including suppliers, manufacturers, distributors, retailers, auditors and customers; its success depends on time, money and a process that is implemented consistently. Use of a common blockchain would provide a shared infrastructure that could streamline workflows for various component parties; and a shared infrastructure could provide auditors with greater access into participants' activities along the supply chain. Besides cost-saving efficiencies, blockchains could enhance the consumer experience, through traceability, transparency, and potentially subsequent resale. Nike was issued patent 10,505,726 (December 10, 2019) for its "System and method for providing cryptographically secured digital assets" (including for facilitating transfer of ownership and combatting counterfeiting as well as other interesting features

such as creating 'digital shoes'). Nonfungible tokens on the Ethereum blockchain can be utilized for such purposes (the patent explicitly mentions ERC721 and ERC1155 tokens). Blockchain can also support producers by verifying adherence to standards important to consumers, and verifying provenance of goods. Early in the COVID pandemic, IBM explored blockchain to facilitate access to PPE; other companies explored blockchain for blood supplies.

3. Electronic health records: While medical records are private, they are very important to share with various medical providers. The privacy of medical records is not necessarily maintained if (unencrypted) email is used to share records. Properly configured, blockchain sharing provides security in sharing medical information. In addition, blockchain smart contracts allow logic to be added in order to process, validate, and sanction access to the data secured within, simplifying consent processes for patients and physicians. [See, e.g., (Vazirani et al., (2020).]

4. Land management (e.g. Cook County, IL, vs international land management): Land management is important to the federal, state, and local governments. Blockchain can provide a shared secured network where all required parties are able to input and view documents and chain of title, to increase trust, accuracy, efficiency, and continuity. This method would eliminate paper usage and enhance security and reduce time and cost.

5. Energy contracts: Blockchain could provide detail real time information about energy usage. Such information could be used by consumers and supplier to enhance efficiency and reduce costs. In addition, energy law compliance information could be provided.

6. Digital art: Digital art can be registered on a blockchain platform, and digital art pieces can also be certified. This allows for authenticity verification and accuracy e.g. for limited edition pieces, and revenue distribution. Digital art can be purchased in fractionated amounts, i.e. multiple owners can purchase fractions of (expensive) art. Nonfungible tokens (such as ERC721 tokens) can be used for ownership and provenance concerns (as mentioned in item 2 above).

7. Educational transcripts/digital badging: Lifelong learning is an educational objective of post-secondary education institutions. Digital badging provides documentation for the learner's claimed acquired knowledge. Lifelong learning implies that a learner may have different educational experiences, including academic knowledge acquired at traditional post-secondary level institutions (like colleges and universities); knowledge acquired at on-line certificate programs; and knowledge acquired on-the-job (including through other life experiences such as serving in the military or in volunteer situations). Digital badging using blockchain technology allows for more trust associated with these credentials, which can be viewed as being held in the 'virtual backpacks' of learners – a blockchain can effectively 'notarise' such certificates, potentially removing concerns of identity and forgery, and making the process much more rapid than is currently the case (whereby learners must periodically and repeatedly secure transcripts from multiple entities).

8. Use of blockchain for nonprofit organizations: Nonprofit organizations are subject to donor concerns of transparency, accountability and absence of fraud; blockchain may help reassure donors that their donations reach their ultimate advertised target. Similarly, perhaps smart contracts could be coded to dispense funds to charities only when certain criteria are met. Blockchain might be able to reduce costs to the nonprofit for banks and other financial intermediaries, or when nonprofits work in other countries that have unreliable internal currencies (e.g. the local currency collapses during a disaster). Blockchains may also be able to assist with supply chain issues for some nonprofits working in disaster relief.

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Video Game and Social Media Usage vis-à-vis Academic Performance in a Marketing Principles Course: An Empirical Analysis

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ABSTRACT
As video game and social media usage continues to grow, particularly in the 18-34-year age group, researchers and educators seek to understand the effect of these technologies on academic performance. The purpose of this research is to examine video game and social media usage vis-à-vis academic performance in the business school—specifically in marketing. Using a sample of 652 university students drawn from a marketing principles course at a large private university, we gather data from an extensive survey of 131 questions. The results suggest judicious video game usage does not have a negative effect on academic performance. However, unbridled gaming is negatively correlated with academic performance. Three different measurements of social media usage indicate a negative correlation with academic performance. Our findings have implications for both educators and students.

Keywords: marketing education, video games, social media

INTRODUCTION

Video game and social media usage continue to grow around the world, with the greatest usage increase in mobile devices. For example, in 2020, more than 2.6 billion people engaged in video games, spending $159.3 billion on video games, with projected spending to exceed $200 billion by 2023 (newzoo.com, 2021; statista.com, 2021). The largest group, gamers between 18-34 years, represent 38 percent of the users (statista.com, 2021). College students fit within this demographic.

As video game and social media usage increase among the 18-34-year-old population, the increased time usage displaces time spent on other activities, like studying for a marketing principles class in our laboratory experiment. That is, the more time spent playing video games and using social media, the less time spent studying. Of course, this applies not only to video games and social media, but to other activities that may displace study time—work, sports, sleep, social engagements, TV, movies, etc.

PREVIOUS RESEARCH

Extant research presents mixed findings regarding video game usage and academic performance for college students. Several studies demonstrate negative correlation between video game usage and academic performance. For example, Weaver et al., (2013) found increased video game usage leads to lower grade point average (GPA) in college students. Similarly, Wright (2011) found that video game players had significantly lower GPAs than college students who did not play video games. Anand's (2007) research demonstrated that as video game usage increases, GPA, and standard aptitude test (SAT) scores decrease. Burgess et al. (2012) found a negative relationship between time spent playing video games and academic performance in college students. Schmitt and Livingston (2015) show that video game addiction is negatively correlated with expected college engagement and GPA. In contrast, other studies find no significant relationship between video game usage and academic behavior and performance (e.g., Hart et al., 2009). In a study of 192,000 high school students (age 15 years) in 22 countries, Drummond and Sauer (2014) found that video game usage had little impact on adolescent academic achievement. Mixed results were reported by several studies. For example, Wack and Tantleff-Dunn (2009) found that frequency of play was not significantly related to GPA. Further, their results suggest that gaming among college men may provide a healthy source of socialization, relaxation, and coping. Ogletree and Drake (2007) found that gaming may have a negative effect on student education, yet a positive effect on cognitive skills.

Similarly, existing research also reports conflicting results on the impact of social media engagement. The potential positive effects of social media on academic performance are highly varied. Deng and Tavares (2013) conclude that

social media usage may enhance critical thinking ability thereby facilitating improved academic performance. Apeanti and Danso (2014) report that students themselves perceive the ability to contact professors through social media as a positive factor in the learning process. Yunus and Salehi (2012) show that social media usage improves students' vocabulary and writing ability. Conversely, both Junco (2011) and Kirschner and Karpinski (2010) show that increased social media involvement correlates negatively with academic performance.

Although prior studies focus on the relationship between video game usage, social media usage, and academic performance for college students in general, there is a dearth of research on business school students. Accordingly, our research examines the effects of video game and social media usage on academic performance in the business school. Specifically, we focus on students in the marketing principles course of the business school.

RESEARCH DESIGN

Using survey research design, we extend the methods of Brau, et al. (2016) and Brau, et al. (2017) who also study factors that influence student performance in undergraduate business classes. When specifically studying marketing students, Brau, et al. (2016) find factors positively correlated with student grades to include college GPA, class attendance, percent of reading completed, self-rated marketing ability, and hours spent studying during exam week. Factors that result in a negative correlation with student grades include the time a student wakes up, English as not the native language, and weekly hours spent in employment.

Our survey instrument includes all questions from Brau et al. (2016), along with 16 multi-part video game questions and five multi-part social media questions. Video game questions were inspired by the work of Anand (2007), Ogletree and Drake (2007), Hart et al. (2009), and Drummond and Sauer (2014). Social media questions were derived from Deng and Tavares (2013), Apeanti and Danso (2014), Yunus and Salehi (2012), Junco (2011), and Kirschner and Karpinski (2010)

Questions ranged from video game playing time to self-assessed emotional effects of video games to types of video games played and more. Social media questions focused on the amount of usage and when the usage occurred. When the multi-part questions are expanded, we have over 150 factors that may provide explanatory power on student grades. The survey instrument is available upon request.

Data Collection

The sample frame for this research consists of 1,053 students in the marketing principles classes at a large, private university. Students were offered extra credit to complete a 131-item questionnaire. Of the 1,053 students, 652 students completed the questionnaire for a response rate of 61.9 percent. This high response rate compares favorably to previous studies (e.g., Brau et al., 2016; Brau et al., 2017). To explore the possibility of response bias that may be driven by the offer for extra credit, we find that students who chose to complete the questionnaire statistically outperformed those who did not by approximately ten percentage points (77.7% vs. 88.0%, Satterthwaite t-test $p<0.0001$) on their course grade. We keep this bias in mind below as we interpret the results. Specifically, our conclusions apply to students who tend to have higher average grades and may not extend to those with lower grades. (We thank an anonymous referee for bringing a potential bias to our attention.)

Data Analysis

Our methods follow Brau, et al. (2016) including factors derived from factor analyses. These methods include univariate Spearman correlation tests; difference in means and median tests based on upper and lower deciles of grades and based on whether a student earns an A or not; multivariate ordinary least squares regressions, and tobit regressions (because the grade is truncated at zero). This extension to Brau, et al. (2016) explicitly tests whether the type and usage amount of video games and social media affect student grades in a university marketing class.

Table 1 reports the summary statistics of the data with total number of responses for each item, mean, and standard deviation.

Table 1: Summary Statistics

Variable	N	Mean	Std. Dev.	Min	Max
Play video games	652	0.466	0.499	0	1
Starting age	282	8.514	3.002	3	18
Parents limit play	299	0.756	0.430	0	1
Average weekly play	287	4.230	4.777	0.5	30
Gaming session length (in hours)	303	1.446	1.049	0.5	7
Play when bored	302	5.960	1.034	1	7
Play when lonely	301	5.043	1.569	1	7
Play when depressed	302	4.546	1.743	1	7
Play to relieve stress	302	5.305	1.507	1	7
Play to be happy	302	4.487	1.252	1	7
Play alone	301	4.781	1.718	1	7
Play with others	301	5.236	1.571	1	7
Play as distraction	302	5.003	1.457	1	7
Difficult stopping	302	3.596	1.647	1	7
Play over streaming	302	3.838	1.644	1	7
Get bored playing	302	4.550	1.424	1	7
Get bored streaming	302	4.533	1.482	1	7
Playing video games interfere with academics	300	4.467	1.605	1	7
Streaming interferes with academics	301	4.864	1.527	1	7
Prefer playing with others	301	5.721	1.511	1	7
View social media	652	0.937	0.243	0	1
Hours of social media time per day	597	2.166	1.379	0.5	10
Play video games in class	651	1.556	1.115	1	7
Use social media in class	652	0.937	0.243	0	1

RESULTS

Table 2 reports the results of the OLS regression model exhibiting positive correlations between the identified independent variables and students' grades for the marketing principles course. The variables in Table 2 are listed in order of statistical significance. Playing video games to relieve stress (p-value = .03) is positively correlated with grades. Although the remaining variables are positively correlated with course grades, they are not statistically significant.

Table 2: Ordinary Least Squares Regression with Course Grade as Dependent Variable—Positive Correlations

Variable	Coefficient	Standard Error	t	P-Value	N
Play to relieve stress	0.863	0.396	2.18	0.03*	302
Get bored streaming	0.550	0.359	1.53	0.127	302
Get bored playing	0.452	0.375	1.2	0.229	302
Parental time limit	1.243	1.182	1.05	0.294	302
Play as distraction	0.334	0.358	0.93	0.351	302
Difficult stopping	0.234	0.291	0.8	0.422	302
Play when lonely	0.256	0.329	0.78	0.437	301
Played when depressed	0.170	0.288	0.59	0.556	302
Play video game over streaming	0.002	0.285	0.01	0.996	302

*Significant at .05

Table 3 reports the results of the OLS regression model exhibiting negative correlations between the identified independent variables and students' grades for the marketing principles course. The variables in Table 3 are listed in order of statistical significance. Hours of social media time per day (p-value = 0.000), social media usage (p-value = 0.001), video game session length (p-value = 0.017), using social media in class (p-value = 0.023), playing video

games in class (p-value = .024), and playing video games (p-value = .029) are negatively correlated with grades in the marketing principles course and statistically significant. Although the remaining variables are negatively correlated with course grades, they are not statistically significant.

Table 3: Ordinary Least Squares Regression with Course Grade as Dependent Variable—Negative Correlations

Variable	Coefficient	Standard Error	t	P-Value	N
Hours of social media time per day	-0.913	0.248	-3.68	0.000*	597
Use social media	-3.212	0.955	-3.36	0.001*	652
Game session length	-0.974	0.408	-2.39	0.017**	303
Use social media in class	-1.543	0.675	-2.29	0.023**	587
Play video games in class	-0.619	0.274	-2.26	0.024**	651
Play video games	-1.391	0.637	-2.19	0.029**	652
Play video games with others	-0.298	0.245	-1.21	0.224	301
Play to be happy	-0.389	0.366	-1.06	0.289	302
Playing interferes with academics	-0.311	0.301	-1.03	0.302	300
Streaming interferes with academics	-0.284	0.292	-0.97	0.332	301
Starting age	-0.132	0.150	-0.88	0.379	282
Play when bored	-0.305	0.544	-0.56	0.575	302
Average weekly play	-0.039	0.081	-0.48	0.633	287
Play video games alone	-0.100	0.237	-0.42	0.673	301
Prefer to play with others	-0.068	0.302	-0.23	0.822	301

*Significant at .00
**Significant at .05

DISCUSSION

With a finite number of hours in a day and increasing demands and opportunities for college students' time, including time spent on video games and social media, researchers and educators remain concerned about how these activities may displace time spent on academic activities, like studying for a marketing class (taught by one of the authors). The results of our research suggest that unbridled video game usage and unrestrained social media usage may prove detrimental to academic performance in a university marketing principles course. Our findings are consistent with previous research, showing negative relationships between video game playing, social media usage, and academic performance across a variety of disciplines (Anand, 2007; Burgess et al., 2012; Schmitt and Livingston, 2015; Weaver et al., 2013; Wright, 2011). Conversely, the results of our research counter prior studies that found no significant relationship between video game usage, social media usage, and academic performance (Drummond and Sauer, 2014; Hart et al., 2009; Wack and Tantleff-Dunn, 2009).

Specifically, for our study, playing video games, video game session length, and playing video games in class are negatively correlated with grades in the marketing principles course and statistically significant. Also, engaging in social media and duration of social media sessions are negatively correlated with grades in the marketing principles course and statistically significant.

Furthermore, our results suggest that videogame usage by college students, in moderation, may prove valuable as a stress-release activity. This result highlights positive outcomes of video game usage and is consistent with the results of Wack and Tantleff-Dunn (2009). Given these findings, we emphasize moderation.

Overall, our research contributes to higher education in general and to business schools in particular by demonstrating the negative and positive effects of video game usage and social media usage on academic performance in a marketing principles course.

CONCLUSIONS

As video game and social media usage continue to grow, particularly in the 18-34-year age group, researchers and educators seek to understand the effects of these activities on academic performance. Two camps have evolved that label video games and social media as either "good" or "bad." A more nuanced approach of the good-versus-bad paradigms is that a measured amount of video gaming or social media usage can be okay, in the sense that it does not decrease academic performance. This view advances the adage, moderation in all things.

The results of our research are consistent with the nuanced approach and suggest judicious video game usage and social media usage does not affect academic performance negatively. Unbridled usage, however, is negatively correlated with academic performance. These findings have implications for both educators and students.

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Developing Mindful Leaders: An Experiential Learning Project

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ABSTRACT

There has been increasing mention in the popular literature around the inclusion of meditation and mindfulness in the development of leadership. Research has shown that mindfulness practices enhance mental health, improve performance in every field of endeavor, and can help develop emotional intelligence and resonant leadership. Although mindfulness training has been embraced by many organizations in the corporate arena, there is little mention of its implementation in an academic setting. This paper discusses the incorporation of an experiential learning component into a senior level undergraduate leadership course which presents an option to develop mindfulness. In addition to outlining the activity, outcomes are discussed as well as reflections for future practice. Although initially met with skepticism, participants shared outcomes which were overwhelmingly positive.

Keywords: leadership development, mindfulness, experiential learning

INTRODUCTION

"A mindful leader embodies leadership presence by cultivating focus, clarity, creativity, and compassion in the service of others" (Maturano, 2014)

There has been increasing mention in the popular literature around the inclusion of meditation and mindfulness in the development of leadership at companies such as Google, General Mills, Goldman Sachs, Aetna, Target, and Green Mountain Coffee Roasters (Pickert, 2014; Rauzi, 2013; Gelles, 2012; Schatz, 2011). Scientific research has shown that mindfulness practices enhance mental health and improve performance in every field of endeavor (Marturano, 2014). Emotional intelligence, which encompasses the competencies of self-awareness, self-management, social awareness and relationship management, is an integral element of resonant leadership, whereby one behaves in a manner which is "in tune" with oneself as well as others. Not only must leaders be able to cultivate relationships, they must blend financial, environmental, human, intellectual, and social capital into effective performance. Mind, body and spirit must work in concert. Developing mindfulness is one strategy for improving emotional intelligence, resonance, and self-renewal (Boyatzis & McKee, 2005).

Although mindfulness training has been embraced by many organizations in the corporate arena, there are few accounts of its implementation in an academic setting (Quatro, Waldman, & Galvin, 2007). This paper discusses the incorporation of an experiential component into a senior level undergraduate leadership course which presents an option to develop mindfulness. In addition to outlining the activity, outcomes are discussing as well as reflections for future practice.

MINDFULNESS AND LEADERSHIP

The notion of mindfulness has been a focus within the profession of clinical psychology for the past thirty years as a mechanism for reducing stress and improving emotional well-being and mental health (Bishop et al., 2004). Kabat-Zinn, (2013) drawing from the Buddist tradition, defines mindfulness as paying attention in a particular way: "the awareness that arises by paying attention on purpose, in the present moment, and nonjudgmentally. This kind of attention nurtures greater awareness, clarity, and acceptance of present-moment reality" (2013, p.xxxv). Mindfulness has also been positively correlated to better decision making, perspective-taking and personal relationships and well as improved physical health and mind-body integration (Brown, Ryan, & Creswell, 2007). There is growing evidence that mindfulness also plays a role in reducing high blood pressure, chronic pain, insomnia, anxiety, depression, substance abuse and eating disorders (Siegel, Ince, & Allison, 2009). Bishop and colleagues (2004) suggest that mindfulness is a metacognitive process. One facet of the process involves the ability to focus attention to thoughts, emotions, and sensations that shift from moment to moment. This is done through a lens of curiosity and acceptance rather than control, and in turn creates a heightened sense of awareness, ultimately facilitating self-insight. It allows for one to step out of the war with one's thoughts and feelings that may have resulted in ineffective behavior, remove ego, and explore from de-centered perspective, alternative approaches. Although one might assume that leaders are acting in conscious rational ways, research has shown that the majority of the time actions,

thoughts, and feelings arise through unconscious automated processes or "mindlessness" (Hunter & Chaskalson, 2013). When an environment is stable, automatic behavioral patterns may be an effective mechanism for handling day to day operations. Habitual understanding will result in habitual reactions, however, in times of change, it may result in limited thinking and an inability to go beyond what is known or understood. For a good overview of mindfulness from the practitioner perspective, one can refer to resources found at Psychologytoday.com ("Mindfulness," 2021) and Mindful.org ("What is mindfulness?" 2020).

Mindfulness is an essential practice of resonant and authentic leadership (Boyatzis & McKee, 2005; Baron, 2016), whereby one works in sync with oneself as well as others. Resonant leaders are emotionally intelligent, empathic and able to read others and build lasting relationships. In addition resonant leaders are able to effect results by blending financial, human, social, and intellectual capital. In light of increasing pressure and complexity, however, it is difficult to sustain effectiveness without some sort of holistic renewal of body mind, heart and spirit. The authors suggest that cultivating mindfulness, in addition to hope and compassion, is the means by which to do so.

Harung and colleagues (2009) extends this notion further to suggest that consciousness or mindfulness, is essential for maximizing leadership efficacy because it allows one to integrate all domains: one's education, experience, values, attitudes, thinking and behavior into a unified wholeness. It enables leaders to optimally use their innate capabilities to perform on a high level, manage stress and navigate complexity. Their model of leadership includes dimensions not covered in the extant literature. It includes higher states of consciousness; enlightenment beyond the common range of human growth; physiologic and psychologic brain integration; and the sociological dimension of leadership which entails the collective development of the organization. In their extensive study of high performers utilizing physiological measures, psychological tests, and self-reports, they found a positive relationship between consciousness, psycho-physiological integration of the brain, and leadership integrity and performance. They also present evidence to support that the meditation can be an effective mechanism for further development.

Good and colleagues (2016), in their comprehensive review, propose a integrative model connecting mindfulness to workplace outcomes. The state and practice of mindfulness first affects functional domains such as cognitive capacity and flexibility; emotional reactivity: self-regulatory behavior: and physiologic manifestations such as stress response, aging, and neuroplasticity. Workplace outcomes may include job performance; citizenship behavior; physical, psychological and behavioral well being; as well as the quality of communication and relationships, empathy, compassion, conflict management, teamwork and leadership.

LEADERSHIP CURRICULA AND MINDFULNESS TRAINING

Mindfulness training has been embraced by many organizations, and it is slowly beginning to be incorporated into an academic setting. Contemplative practice or mindfulness has been documented in the literature in disciplines such as philosophy, psychology, law, and social work but less so in business related disciplines (Bush, 2011; Taylor & Bishop, 2019). Quatro and colleagues (2007), suggest a more holistic approach to leadership development that encompasses analytical, conceptual, emotional and spiritual domains in order to more effectively navigate change, complexity, and ambiguity. If one were to examine the curricula of leadership programs, one will find a plethora of course materials, readings and experiential activities related to acquiring knowledge or developing skills. Business schools and corporate training programs are adept as teaching analytical skills such as quantitative analysis or logical reasoning, as well as conceptual skills such as qualitative analyses, creativity or group process facilitation. There is typically, however, very little focus on the development of the emotional and spiritual facets in either academic or corporate settings. Areas addressed less frequently include the development of emotional intelligence, self-monitoring, empathic communication or inspirational activity. Equally as infrequent is the focus on the development of the spiritual domain which includes self-reflection, integrity, and meditative thinking (Quatro, et. al, 2007). Advocates for incorporating mindfulness training into the business curriculum (Dumas, 2007, Keuchler & Stedham, 2018; Lampe & Engelman-Lampe, 2012) suggest that the practice can help students more more effectively navigate complexity, remain open to new experience, improve ethical decision making, cultivate resilience and foster emotional intelligence.

Although contemporary leadership development typically involves a process of reflection (Roberts, 2008), whereby one reflects on past action and consciously makes a choice to change future behavior, mindfulness, on the other hand, increases awareness in a different manner by focusing on the present. It allows one to process information in real time, examine one's intentions, and adjust behavior before it has negative consequences. Mindfulness training (Hunter & Chaskalson, 2013) can be a powerful and effective strategy for helping contemporary leaders navigate

"uncharted waters" fraught with change, complexity and uncertainty. The process of attending to oneself as well as others, rooted in the here and now, allows one to consciously adopt more positive and productive ways of being.

Developing mindfulness is typically accomplished through learning techniques such as meditation. The majority of practices involve sitting, however approaches also include lying down, practicing yoga or meditative walking (Hunter & Chaskalson 2013). Marques and colleagues (2014) present meditation as an effective practice which enhances "workplace well-being through improved communications, efficient meetings, optimum performance, better decisions, and greater understanding" (p. 84).

THE EXPERIENTIAL LEARNING PROJECT

In an attempt to expand my students' learning beyond the cognitive realm, a semester long experiential learning project was incorporated into an undergraduate senior Leadership Philosophy course. In this course, students have traditionally explored notions of leadership that have been evident through time starting with ancient philosophers such as Lao Tzu, Aristotle and Plato, and moving up to the current day. The exploration involves dialogue, self-assessment, values clarification, and reflection, and culminates in the synthesis of a personal model of leadership that resonates with their own philosophy. An experiential component was added in an attempt to incorporate a more holistic approach. A brief overview of the project follows.

At the beginning of the semester, students are presented with a holistic model of leadership development that includes the integration of the mind, body, and spirit. A variety of resources are presented to them illuminating the benefits of mindfulness, meditative practice, and physical activity on their well-being and personal effectiveness. They are charged with researching, selecting and practicing an activity over the course of the semester such as meditation, yoga, tai chi, or some sort of physical regimen, and reflecting upon the impact it has had on their life. They are required to track their efforts via a journaling process that includes date, time, duration of activity, feelings, and impressions experienced during or immediately after each session. As the semester nears completion, they are required to submit a reflection paper that includes the background and rationale for choosing the activity, review of the current literature related to their activity, and a critical reflection of the experience that includes a description of what happened (positives and negatives), what they have learned from the experience (did it make them more effective in some way?), and how they will use this information going forward. .

RESULTS

To date, I have made this exercise available to a total of 57 students over the course of three terms. Although the majority of the students selected a physical activity, a total of twelve students chose some form of meditative practice to include sitting quietly, guided meditation, meditative walking, yoga, tai chi, and/or devotional reading. Some did a combination of physical activity and meditative practice. Their reflection papers were analyzed retrospectively for recurring themes and outcomes. Although at first the assignment was met with considerable skepticism, the outcomes were overwhelmingly positive. The most common drawback cited was difficulty in finding time to complete the required activity, however, several positive physical, psychological and/or social outcomes were reported and summarized as follows:

- Less stress/feeling of peace/calm/feeling more centered (8)
- Physical changes such as increased energy, better sleep (6)
- More Positive outlook/positive interactions with colleagues (5)
- Confidence (2)
- Ability to concentrate/focus (2)
- Sense of openness (2)
- Re-arrangement of priorities

In four cases, the students noted that because of the benefits gained, they planned to continue the practice even after the course was over. Some of the representative comments are included below:

> *…Overall, this experiment has been successful at helping me achieve a more positive attitude, gain a greater sense of concentration and feel more energized. I will continue to utilize these techniques so that I can build endurance for those leadership challenges that lay ahead… The days my stress levels jumped correlated with my level of being negative. The days my stress were lower, I became more productive and found the teams I worked with were more willing to work harder. I was more focused the days following my night meditation and fitness routines. I could sleep better and found myself rejuvenated to start my day. The days that I did not*

meditate or workout, I missed the feeling of motivation and energy and it was harder to deal with the stressors at work…. (Student A)

…I felt like I had accomplished something bigger than the world itself… I had learned how to overlook everything going on with me, my living situation, my financial situation, my car situation, and was able to find peace within. And each day became easier to take on to overcome. I was ready for every exam, I was ready to hear there was something else wrong with the car, I was ready to be disappointed by the next apartment I walked into. I walked into each situation with a smile on my face and my mind open and clear. Even after being disappointed, I still able to maintain a smile and upbeat attitude. Meditating is definitely something that I will continue and would recommend anyone who hasn't to start. As told throughout my paper it's not only good for your health but also good for your overall life… (Student R)

… When I am strung out over my schedule I find myself more tired than usual. Meditating has taught me the ability to focus on what is right in front of me and what is truly important. When I am able to strip myself down of all the things that bring negativity and stress into my life, I find a new energy to take on the immediate task that is set before me…Today I am able to see a direct correlation between my time spent in meditation, and how I feel and interact with others. Knowing that this is the answer to my busy mind will be a great tool to use in the future when times are getting tough. It is very noticeable the days that I take off when I try to get back into it a couple days later. When I take a break of meditating I allow all my thoughts and busyness to build up…It is when I practice meditation on a routine basis this I taste a free positive self that is ready to take on the world and the tasks for the day. (Student M)

Fortunately for me I did not experience any negativity due to the meditation experience. Any negativity was my own and it was only at the beginning. It was my bad attitude about having to add something to my already busy schedule and then letting my skepticism in while meditating on my readings. I would recommend meditation to a friend especially if they are experiencing a high level of stress. I would encourage them to do their own form of meditation though so it would truly be effective and not everyone out there believes in the same things that I believe in. For some people no devotional readings are necessary; just sitting in a quiet room with no distractions may be the best thing for them. For others it may be listening to inspirational music…I have thoroughly enjoyed this assignment and I am extremely grateful that I did it. It does not in any way make the stresses not stressful anymore and it definitely will not keep other stressors from entering into the picture. The purpose of the meditation is to better handle those different stressors that come up… As I close out this assignment, I will end by saying that this experience has been very successful to me and good for me. While the assignment portion (writing about it) has ended, the experience part will not. Meditating and having my devotion time will continue to be a part of my daily life…(Student K).

Interestingly, when this project has been presented to the students, the majority choose to pursue some sort of physical activity over meditative practice. Reasons cited include a past negative experiences with meditation, personal discomfort, or a lack of interest. Although the results are beyond the scope of this paper, those pursuing additional physical activity have reported positive benefits related to stress management, self-confidence, and well-being, all of which ultimately contribute to leadership effectiveness as well.

REFLECTION AND DISCUSSION

The results from this experience are extracted from a small sample in a limited setting but they are encouraging. A majority of the students, regardless of the activity chosen, remark upon the unique nature of the assignment and its effect on their world. In many cases, this has been the only course in which a holistic "mind, body, spirit" approach is taken. It is particularly relevant for leadership students but applicable to most any other major. There is some evidence that even small "doses" of mindfulness training can be effective (Good, et.al.,2016).

The course has been generally offered to students nearing the end of their college career. Alternatively, if activities such as this were able to be introduced earlier in their academic career, and perhaps repeated in various venues, it might enhance students' effectiveness and ultimate success in college. The course was also structured to provide students some choice in how they approached this project in order to lead their own learning. It is somewhat disappointing that more do not choose the meditation option, but the goal of the project was for the students to gain more than just knowledge. Forcing students to practice something they are not willing to engage in would serve to be counterproductive. Others have chosen to incorporate more structured and specific training into the classroom in through a variety of activities (Taylor & Bishop, 2019). Going forward, it may be helpful to "sell" the process and benefits a bit more by including additional resources such as PositivePsychology.com ("What is mindfulness?",

2021) as well as feedback from previous students that shares the journey from skeptic to awareness, discovery and adoption to transformation.

> *While the assignment portion (writing about it) has ended, the experience part will not. Meditating and having my devotion time will continue to be a part of my daily life…*

It would be interesting to read of other accounts of activities as well as outcomes.

CONCLUSION

As the need for resonant leaders who can integrate intellectual, human, financial, and social capital continues to grow, it is incumbent upon us as educators to consider more holistic models of leadership development which incorporate practices such as mindfulness and meditation. The exercise discussed in this paper was exploratory in nature and outcomes noted were based on anecdote and perception of the participants but the results were encouraging. Good and colleagues (2016) note that although mindfulness training has been incorporated in variety of corporate settings, positive results have been mainly reported anecdotally by the participants. They call for more rigorous empirical work such as experimental or quasi-experimental field studies that can directly link mindfulness development to improved organizational outcomes. The call also applies to settings in higher education. As mindfulness becomes more mainstream, other colleagues are encouraged to further this work.

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Negotiation Strategy: "Declining Increments of Concession"

An Effective Classroom Role Play

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ABSTRACT

The successful teaching of critical negotiation concepts is greatly enhanced by effective classroom exercises. This paper provides a classroom-tested role-play exercise that in about an hour successfully teaches students how to prepare a strategy for making successful counter-offers during a negotiation that is largely a single-issue negotiation such as buying a house, car, appliance, etc. It also provides instructors with debriefing suggestions that include three teachable moments. To prepare for the exercise students are introduced to common opening offer strategies and common strategies for making counter-offers. A role-playing exercise directs one student to utilize the ***"declining increments of concession"*** strategy when making counter-offers, while the other student is instructed to utilize a "*meet in the middle*" strategy. In classes involving hundreds of students over fourteen years, students demonstrated their successful utilization of the ***"declining increments of concession"*** strategy to achieve their desired price, and have thus achieved a more desirable outcome than the commonly utilized "*meet in the middle"* strategy! The exercise not only enables students to correctly identify and utilize the strategy in negotiation situations, but more importantly, they recognize the strategy as one that they can use in their daily personal and professional lives. The exercise included in this paper was developed by the authors and successfully used in many "real world" cases, and has been classroom tested. The exercise can easily be utilized in courses on negotiation, conflict resolution, organizational behavior, management, psychology, and labor relations.

Keywords: teaching negotiation, negotiation exercise, opening offers, negotiation counter-offers, pattern of increments of decreasing concessions.

INTRODUCTION

Teaching negotiation concepts, skills, and theory to undergraduate students is both a challenging and rewarding experience! Many of the key concepts, skills, and theories are best taught with effective classroom role-plays, simulations, and exercises. Fortunately, negotiation and conflict resolution courses lend themselves to the utilization of these active learning methods because many "real world" negotiations are conducted one–on–one or between two teams of negotiators, which can be simulated in a face-to-face class or online. The authors developed this exercise, which is based Herbert Cohen's "***declining increments of concession"*** strategy (1980), and have utilized it in many years of professional negotiating. In addition, it has been classroom-tested in negotiation courses. The exercise provides true negotiation "teachable moments" involving the offers and counter-offers that are commonly employed by experienced negotiators in bargaining situations. The goals of this paper are to provide instructors with an easily adopted exercise that demonstrates an effective strategy for deciding counter-offers proven by years of practical experience and classroom-tested for over a decade, and yet unknown by most students and novice negotiators.

Negotiation situations can be broadly classified as either distributive or integrative. The terms distributive bargaining and integrative bargaining were first identified by R.E. Walton and R.B. McKersie in the seminal work *A Behavioral Theory of Labour Negotiations* (1965).

- Distributive bargaining, or single-issue negotiation, occurs when two parties strive to negotiate what can be viewed as a fixed pool of assets – often called "fixed-sum" or "zero-sum". The fixed-sum is most often money and thus what one party gains in the negotiation, the other party loses, and thus it is also called "zero-sum" bargaining because if for example, one party negotiates $1,000 more in the price of an object, then the other party has lost $1,000. Common examples of distributive bargaining situations include large ticket items such as buying a car, house, appliances, furniture, etc. (Rees & Porter, 1997).
- Integrative bargaining can be defined as a negotiation situation when two parties that have a long-term future relationship strive to integrate their interests on multiple issues (Fisher & Ury, 1991). Common

examples of integrative bargaining include union–management contract negotiations, relatives settling an estate, and spouses deciding their housing needs (Carrell & Heavrin, 2008).

By contrast, parties in a distributive situation seldom have a future relationship, do not share their true interests, and seldom seek new mutually beneficial options, but instead focus on exchanging counter-offers containing concessions while striving to reach agreement on one primary issue – money (Harvard Business Essentials: Negotiation, 2003). In general, all parties must be prepared to use distributive bargaining techniques successfully because most everyday negotiations that focus on money will involve a distributive process, and even those situations that start as an integrative process at some point boil down to a distributive process over money.

Opening Offers

Before a negotiation starts the parties normally decide three important values:

(1) *opening offer*,
(2) *walkaway value or resistance point* – the maximum or minimum they will pay or accept,
(3) *desired price* – where they hope to settle based on information they have collected, their last negotiation, specific need, the funds available, or even a hunch!

For example, a house is listed at $475,000. The buyer wants the house, makes an opening offer of $420,000, and knows their walkaway price is $460,000 because that is their maximum pre-approved loan amount. Their desired price is $445,000 based on the actual sold price of comparable houses. Opening offers can be based on a variety of strategies including the "lowball" which is well known, but rarely works, however it may anchor the negotiation (set the outside value) if the other party accepts it as a serious opening offer and responds to it. However, the other party is more likely to walk away. Another opening offer strategy utilized by experienced negotiators is the "desired pricing strategy" which requires the negotiator to make an opening offer that puts their desired price exactly in the middle between the opening offer of the other party and their own opening offer. A third useful opening offer strategy is the "lowest with justification" (a favorite of the authors). This opening offer strategy employs the logic that since you must make an opening offer, and to be useful it must be accepted by the other party – then choose the most extreme offer that you can justify which gives it credibility. The other party may not accept your justification, but they often accept it as your opening offer and therefore you have gained a wider bargaining range and one that is more favorable to you (Carrell, Heavrin, Manchise, 2018)!

Distributive negotiations begin with the parties, buyer and seller, making opening offers. The opening offers set the range of the negotiation because no buyer would pay more than the seller's opening offer, and no seller would accept less than the buyer's opening offer. Once the opening offers are made, the bargaining process of bracketing begins. Bracketing is the bargaining process where the parties move toward the middle point between the opening offers (brackets) by making counter-offers until a settlement is reached, or one or both walk away and end the negotiation (Craver, 2002). Negotiators often expect their initial offer to be rejected and thus must think about their counter-offer(s) as the bargaining begins.

Counter-Offers: Pattern of Concession Strategy

A critical point in a negotiation is when opening offers are "on the table" and novice negotiators have not considered developing a counter-offer strategy. They should, however, carefully consider choosing a pattern of concessions that will lead the other party to guess that they have a certain reservation price (maximum or minimum) at which they will end the negotiation when it reaches their "walk-away" price. However, as a negotiator, you can more likely achieve your desired price and thus the best possible deal if you choose a pattern of concessions that includes a "***declining increments of concession"*** strategy (Cohen, 1980). That strategy leads the other party to believe you have reached your walk-away price and will go no further, but in reality, it is your desired price! This deliberate and strategic choice can easily be the determining factor in a negotiation, which ends at or near a negotiator's desired price instead of their resistance point, or simply meeting in the middle.

Consider the seller of a house listed at $390,000. The buyer's first offer = $310,000, second offer = $330,000, third offer = $340,000, and fourth offer = $345,000. After reviewing the buyer's pattern of offers, what does the seller believe is the buyer's walk-away price? The seller is likely to think the buyer's walk-away price is $345,000, and thus if motivated to sell, will make a counter offer equal to or very near $345,000. However, if in fact the buyer's walk-away price = $365,000 and their desired price was $345,000 and they had employed a pattern *of "**declining***

increments of concession" strategy that led the seller to falsely believe $345,000 was the walk-away price, they are very likely to achieve their desired price!

Another common counter-offer strategy is the "meet in the middle" strategy – often viewed as fair since both parties concede equal amounts. However, that strategy is only fair if both parties initially set equally fair opening offers – which seldom happens! The meet in the middle strategy most often benefits the more experienced negotiator. A wise negotiator once said; "Friends don't let friends meet in the middle"! Another common counter offer strategy is; "split the difference" where a buyer simply evenly splits the difference between the seller's last offer and their last offer.

Overall, the "desired pricing" strategy is more often likely to result in a negotiator achieving their desired price than other strategies including "meet in the middle", "split the difference", and others. In addition, the worst possible strategy for making counter-offers is – no strategy at all, but simply responding in kind to that of the other party, which gives them a valuable advantage. For example, the other party conceded $10,000, thus the negotiator matches their concession and future concessions. Who does that benefit most? – The negotiator who started with the extreme opening offer! In negotiation classes, students need to learn the importance of different patterns of concessions, and the *"**declining increments of concession"*** strategy for making counter-offers enables them to achieve their desired price.

THE LESSON PLAN

After introducing the difference between distributive bargaining and integrative bargaining (Walton & McKersie 1965), and a discussion of a distributive, single-issue negotiation including a brief summary of opening offers and counter-offers, students are divided into two groups. The instructor provides no prior discussion of "meet in the middle" or "decreasing increments" negotiation strategies. Each pair of students is given one "buyer" role-play and one "seller" role-play, and then they are told to silently read their paper, not discuss their information with their partner, and then negotiate a settlement price with their partner.

The "Seller" Chris Tolliver Role Play:

Chris Tolliver has decided to sell his beloved 2017 Honda Pilot. Chris has taken excellent care of the vehicle which has always been garaged, received all the recommended maintenance at the Honda dealer (and Chris has all the records). However, Chris has decided to buy a smaller more fuel-efficient vehicle. Chris put a sign in the window of the Pilot: "For Sale: 2017 Honda Pilot, 60,000 one-owner low miles, great condition, DVD, roof rack, leather seats."

Bob Hillard lives down the street from Chris and noticed the sign on the window of the Honda. Bob has known Chris personally for many years and knows he takes good care of his home and vehicle. Bob has been looking for a new vehicle to replace his 12-year-old Buick and thus called Chris about his Honda. After driving the Honda, the two sit down to negotiate.

Chris has done some online research to prepare for this meeting with Bob Hillard. The value of a 2017 Honda Pilot with 60,000 miles in good condition ranges from $7,100 to $13,200 according to the online references: Kelley Blue Book, Edmunds, and Consumer Reports. Since he and Bob are neighbors and friends, Chris has asked you to negotiate for him, while he sits quietly to the side. Chris posted a price of $13,900 on the sign in the window. Chris has told you to do the best you can, maybe use the old "*meet in the middle*" strategy, but anything over $8,200 is acceptable to him and he would like to see his friend get the Pilot.

The "Buyer" Bob Hillard Role Play:

Chris Tolliver has decided to sell his beloved 2017 Honda Pilot. Chris has taken excellent care of the vehicle which has always been garaged, received all the recommended maintenance at the Honda dealer (and Chris has all the records). However, Chris has decided to buy a smaller more fuel-efficient vehicle. Chris put a sign on the window of the Pilot: "For Sale: 2017 Honda Pilot, 60,000 one-owner miles, great condition, DVD, roof rack, leather seats."

Bob Hillard lives down the street from Chris and noticed the sign on the window of the Honda. Bob has known Chris personally for many years and knows he takes good care of his home and vehicle. Bob has been looking for a

new vehicle to replace his 12-year-old Buick and thus called Chris about his Honda. After driving the Honda, the two sit down to negotiate. Chris listed a price of $13,900 on the sign in the window.

Since Bob and Chris are neighbors and friends Bob asked you to negotiate for him. He instructed you to think of $11,600 as the absolute highest price he can pay. But Bob has done some online research to prepare for this meeting. The value of a 2017 Honda Pilot with 60,000 miles in good condition ranges from $7,100 to $13,200 according to the online references: Kelley Blue book, Edmunds, and Consumer Reports.

Bob decided you should use a negotiating strategy he read about called "*Decreasing Increments*". Thus, he wants you to open with an offer of $6,100 – and justify it as "a number you saw online for the vehicle". Then think of $9,000 as the price you would like to settle on. Then make your second offer a large increase to about $7,000, but after that, each counter-offer you make should be a smaller increase than the last counter offer you made. Thus. possible counter-offers would be $7,000 / $7,800 / $8,500 / $9,000. This should give the impression that $9,000 is your top offer – or walk-away price.

Instructor Debriefing: The Success of the "Declining Increments of Concession" Strategy

After all students have completed their negotiation, the instructor asks students to report on their negotiation, explaining how they felt with each offer / counter-offer, and what price they settled on for the sale of the Honda Pilot. To emphasize the range of settlement prices, the instructor should list all negotiated prices for the students to see, and note the total range of settlement prices- typically, $8,200 - $11,600 which is the entire settlement range. The instructor can then debrief the class on the lessons of the exercise, and point out three "teachable moments" from it;

*In this negotiation, the Buyer (Bob) was instructed to use the "**declining increments of concession strategy**" while the Seller (Chris) was instructed to use the "**meet in the middle strategy**". The opening offers were $6,100 and $13,900 and thus the midpoint was $10,000. It is critical to remember that once opening offers are made, the midpoint is the most common settlement price, especially when novice negotiators are involved.*

Teachable Moment 1:

*If the Buyer (Bob) was successful in utilizing the "**declining increments of concession strategy**" the final negotiated price was less than the midpoint and much closer to $9,000 his desired price, or in some cases even less. A settlement of $9,000 for the Buyer (Bob) is very impressive considering the midpoint of the opening offers ($6,100-$13,000) was $10,000 - thus for most Buyers (Bob) the declining increments of concession strategy worked. The Buyer (Bob) was willing to go as high as $11,600 - his maximum / walkaway / resistance point. The Seller (Chris) was willing to go as low as $8,200. Thus, any settlement in this range of $8,200 - $11,600 is possible because both negotiators would have been within their acceptable maximum / minimum values.*

*The strategy works! In about 94% of the hundreds of past classes in which students have performed this negotiation, the settlement price is between $8,200 - $9,500, thus indicating Buyer Bob's "**declining increments of concession strategy"** saved him money because the final price was less than the midpoint and closer to Bob's desired price!*

***Teachable Moment 2**:*

Some students may have agreed at some point to "meet in the middle" which is the strategy Seller Chris was told to use. This tactic is almost never a good one to accept. Why? Because unless both of the opening offers and counters were equally fair - agreeing to meet in the middle, while it sounds reasonable (because people accept the equality principle), agreeing to the other party's offer to meet in the middle is almost never a good tactic! Why? Because it is only equally fair to both parties IF their initial offers were equally fair – which is seldom the case!

Teachable Moment 3:

In most cases the highest negotiated price in the class = $11,600, and the lowest = $8,200 because this was the settlement range set by the maximum / minimum values given to Buyer Bob and Seller Chris. Think about that - a

difference of $3,400 in price solely based on the skills and strategy of the negotiators. That $3,400 equals 38% of the most common settlement value of $9,000. That is a strong indication of the potential power of negotiation strategies!

Teachable Moment 4:

In a few cases, students do not reach an agreement on the sale. They decided upon a "walk away" point and chose to end the negotiation. Reasons might include feeling that the other person, typically Buyer Bob, really wasn't interested because he started at a low price $6,100 and the second offer was still considered quite low at $7,000. Although a walkaway ending is not the goal of this negotiation, when it happens, it is still an important teachable moment. Why? Whenever one goes into a negotiation he/she should have a "walk away" price planned, regardless of whether they are the buyer or the seller- and they should be prepared to exercise it.

CONCLUSIONS

Academic lectures are more effective when faculty also utilize an active learning approach, including, but not limited to role-plays, exercises, and simulations, and experiential learning as described by psychologist, David Kolb (1984). People simply learn best through experience. Students retain lessons best when they are involved in determining the solutions to given simulations. In this process, students have an increased level of engagement and ownership in the negotiation, and can then reflect on their negotiations, and determine what they would do differently the next time.

This exercise has been classroom-tested, in both face-to-face classes, and online delivery of instruction, and has been refined over several years. Students understand, learn and demonstrate that a negotiator is more likely to achieve their desired price and thus the best possible deal if they choose a pattern of concessions that includes a "***declining increments of concession"*** strategy (Cohen, 1980). Instead of meeting in the middle, where many novice negotiators end up, the strategy leads the other party to believe you have reached your walk-away price and will go no further, but in reality, the negotiator can often achieve their desired price!

The authors have witnessed numerous examples of students utilizing and refining their negotiation techniques with this negotiation exercise. Many students have reported that role-playing negotiations have provided them with skills to utilize throughout their life in all types of negotiation experiences, ranging from making a major purchase, to negotiating salary and benefits in a career opportunity.

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Enhancing Student Engagement and Increasing Student Success Using an Online Discussion of the Great Recession

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ABSTRACT

Student success involves not only the attainment of a high level of academic achievement, but also includes students having a high level of satisfaction with the overall educational process. Enhancing student engagement helps to achieve student success. This paper relates how an online discussion assignment may be used to engage students and how this can lead to greater student success. Several important factors should be considered by an Instructor when designing a discussion assignment. The discussion topic should be interesting with various perspectives considered. The topic selected should be relevant to the course and to the students. The topic used for the discussion assignment analyzed in this paper is the Great Recession. The assignment was included in a Money, Banking, and Financial Markets class over six sections from 2018-2020. Using a discussion assignment at the very beginning of the class has specific benefits, allowing the Instructor to introduce the class content and getting students to engage with each other. This method/assignment can serve to introduce a quality teaching presence, cognitive presence, and social presence in the classroom from the very beginning of the course. These elements have all been shown to increase student success.

Keywords: Economics Education, Great Recession, Student Engagement, Student Success

INTRODUCTION

This paper focuses on one method of teaching for the purpose of enhancing student engagement and student success in a Money, Banking, and Financial Markets class. The tool used is an online discussion board assignment. The tool may be adopted for use in any face-to-face or online class whereas the topic can be changed to more appropriately address different subjects in different classes. The topic of the discussion assignment is the great recession. An overview of the topic is included to illustrate details of how this pedagogical tool, the online discussion assignment, can be effectively utilized by an Instructor.

Money, Banking, and Financial Markets is an important class in the study of economics and finance education. This class is commonly taught as a junior-level undergraduate course for students majoring in economics and/or finance. Chapter 1 of textbooks used in a typical Money & Banking class typically introduce the student to the interconnectedness of the financial system (Cecchetti & Schoenholtz, 2021) (Saunders & Cornett, 2015). The textbooks do a wonderful job of presenting the financial system very broadly. However, broad descriptions of various types of financial institutions and financial instruments often fail to capture students' interest. Getting students to see themselves and their families in history will lead to greater student engagement (Ujifusa, 2020). Connecting students to the material, other students, and the instructor will lead to greater student success (Law & Law, 2018). The discussion assignment accomplishes all of these. The overarching goal of using this method to teach about the great recession is to increase student success. This includes achieving high levels of student academic achievement along with student satisfaction of the educational process.

LITERATURE REVIEW

The study of history is very useful. It helps students understand "How the Society We Live in Came to Be" and "The Importance of History in Our Own Lives" (Stearns, 1998). A brief review of relevant literature is provided here to demonstrate how using an online discussion of recent historical events, the Great Recession, can be utilized to enhance student engagement and increase student success.

Student Engagement

It is worth noting that many students are wary of engaging in a face-to-face classroom, particularly on the first day of class. Even when given an opportunity to speak, students sometimes shy away from discussion for several reasons. Students may simply have an introversion personality, sometimes described as a preference for solitude, anxiousness, or shyness (Grimes, Cheek, & Norem, 2011). Issues related to student diversity, lack of knowledge of the topic, or the fact that time is limited in the classroom may produce a reticence for students to engage. Sometimes students are simply inclined toward anonymity (Damron & Mott, 2005) (Ensign & Woods, 2014) (Reavis, 2020)

(Seethamraju, 2014). As Instructors and students know, there always seems to be one or a few students in each class who dominate discussions, making it difficult for other students to participate.

Using an online discussion allows students to engage outside of the physical classroom and avoid many of the challenges present in the physical classroom. Today's students "have been raised in a culture of expression, engagement, and learning through online interactions using technological devices" (Carrasco-Gallego, 2017, p.19). As a result, students may overcome their reticence by engaging online, where they are often more comfortable.

Online discussions are a valuable tool for Instructors for both online and face-to-face classes. Using a discussion assignment in a face-to-face class not only allows students to engage when they might not otherwise for reasons already addressed, but also allows the Instructor to avoid taking up valuable class time when other material may be covered in a lecture format. Because of the benefits, it is no surprise that the use of online discussions have increased in face-to-face classes (Gao, Zhang, & Franklin, 2013) (Seethamraju, 2014).

Student Success

Student success means not only achieving a high level of academic achievement, but also students being well-satisfied with the overall academic/educational process (Law & Law, 2018). According to Van Wart, Ni, Ready, Shayo, & Court (2020), the most important element affecting student success is a teaching presence. Teaching presence is characterized by the overall course design, organization, facilitation of the class, and quality feedback. These elements are perceived by students as things that provide assistance to their learning and are highly important to them (Van Wart, et. al., 2020).

The second most important element of a course that impacts student success is cognitive presence (Van Wart, et. al., 2020). Cognitive presence is characterized by including course materials to facilitate deep learning, pique curiosity, provide a variety of perspectives, and "spur reflection, debate, and insight" (Van Wart, et. al., 2020, p.15). Whether in an online or face-to-face course, assigning an online discussion assignment on the first day of class can help establish a cognitive presence that can accomplish these things.

Beyond teaching presence and cognitive presence, much research has demonstrated the value of having social presence in the classroom to encourage student success. Social presence is defined broadly as student interaction with other students and with the instructor. Research on this element has produced mixed results based on the course subject and student demographics (Van Wart, et. al., 2020). However, there is still a body of research with findings that a social presence is very important. For example, several studies show that a course design which helps to build a sense of community in the classroom will increase overall student success (Law & Law, 2018) (Shackelford & Maxwell, 2012) (McMillan & Chavis, 1986).

The four top student-student interactions that may be incorporated to establish a social presence and increase student success are (i) student introductions (ii) collaborative group project (iii) student's contribution of personal experiences (iv) entire class online discussions (Shackelford & Maxwell, 2012). A well-designed online discussion may incorporate more than one of these interactions and help to build a sense of community within the online or face-to-face class. In addition, well-designed online discussions can lead to increased critical thinking skills and promote professional writing skills (Gao, et al, 2013) (Jewell, 2005). "Student participation, encouragement, and peer-to-peer interaction consistently emerge as being significantly and positively related to critical thinking" (Smith, 1977, 180).

Causes & Consequences of the Great Recession

Beyond simply getting students to engage, it is important to introduce students to the course subject material. Students need information on the subject and they need to begin to engage with other students. The topic selected for introducing a Money & Banking class is purposefully broad. Many finance and economics textbooks include information on the financial system and the Great Recession. These texts typically address Great Recession related issues including the deterioration of mortgage markets, subprime lending expansion, the decline in stock markets, increased unemployment, and governments' responses to the financial crisis (Cecchetti & Schoenholtz, 2021) (Saunders & Cornett, 2015). The textbooks are always a good place to start, but there are many lessons to learn about the financial crisis from other sources too (Blinder, 2015).

Causes of the Great Recession

Many volumes of works have been written in an attempt to clarify the causes of the great recession. This limited literature review is not intended to cover the topic exhaustively. On the contrary, it is intended to identify some of the major issues and illuminate some things not covered in the textbooks. Today, it is commonly understood that the housing market in the United States was forming a bubble in the early 2000s. The real question for students is – why?

A number of major events occurred in the years leading up to the financial crisis. First, the Clinton Administration sought to increase homeownership so that more Americans could enjoy the American dream. The push from the Clinton Administration started in 1995 with Housing and Urban Development (HUD) lowering down payments for home loans to lower income borrowers. Then in 1999, Clinton signed the Financial Services Modernization Act. This act repealed critical parts of Glass-Steagall Act of 1933, which had been put in place after the great depression to separate commercial banking and investment banking activities (Lin, n.d.). It is difficult to determine what parts of the 1999 law may have contributed to the financial crisis of 2009 because the 1999 law has very broad implications (Lin, n.d.). Even after several years, the debate on the impact of the Financial Services Modernization Act is uncertain. In 2013, Mahon, at the Federal Reserve, still acknowledged that the issues were not yet settled. Also in the years leading up to the crisis, mortgage lenders took on much more risk by making large amounts of sub-prime loans (Financial Crisis Inquiry Commission, 2011) (Gramm & Solon, n.d.) (Holmes, 1999).

Potentially, the most reliable source focused on the causes of the great recession is the Financial Crisis Inquiry Commission (FCIC). The FCIC was formed in May 2009 and tasked by Congress to explain the crisis. In its summary statement, the FCIC concluded, "...that the monetary policy of the Federal Reserve...created conditions in which a housing bubble could develop. However, these conditions need not have led to a crisis" (FCIC, 2011). The FCIC (2011) went on to address failures of regulators, lending standards, ratings agencies, the Securities and Exchange Commission, federal banking supervisors, and "accountability and responsibility throughout each level of the lending system". In the FCIC (2011) summary conclusions, almost nobody was left without blame.

Consequences of the Great Recession

"Panic and uncertainty in the financial system plunged the nation into the longest and deepest recession in generations" (FCIC, 2011, 389). This quote from the FCIC's report helps to put the recession into perspective. The FCIC was established in 2009 and took approximately 18 months to complete its final report of the causes and consequences of the Great Recession. The FCIC report identifies several consequences of the Great Recession as of 2011. Among these were the loss of 3.6 million jobs in 2008, the largest loss of jobs since 1940. The underemployment rate stood at 17.4% as of December 2008. Gross Domestic Product fell during the Great Recession by its largest rate since 1946. Households' net worth dropped dramatically. Lending to businesses dried up significantly. State and local governments struggled with reduced tax revenues. Then, as of the writing of the report in 2011, "about four million families have lost their homes to foreclosure" p.402.

Economic hysteresis continued for several years following the Great Recession. Even by 2017, when the macro-economy had largely recovered, some people were still suffering. Their lingering suffering took the form of increased inequality, less vibrant and productive work, increased disability claims, and other disruptions to workers' careers (Cappelli, Barankay, & Lewin, 2018) (Lowrey, 2017).

Employers used the Great Recession as an opportunity to fire workers. More particularly, low-skill workers were losing their jobs at a faster rate than highly educated workers. In the period of recovery, "the rich (were) getting richer and the poor recovering far less" (Lowery, 2017). Also, according to Lowery (2017), the recovery was worse for people of color. The legacy of the Great Recession was a more unequal and more racially divided country (Lowery, 2017). After reviewing many sources on the topic, it seems clear that Kudlow & Moore (2016) were right to argue that the Clinton administration policies are "a perfect example of ... using government ... to help the poor, but the ultimate consequences were disastrous for them". Although it may also be fair to argue that these disastrous consequences were the result of corporate greed as anything else.

It is also clear that the FCIC did an outstanding job of uncovering/identifying issues causing the Great Recession. However, the FCIC itself was divided in its adoption of the final report. There were six Commissioners appointed by Democrats in Congress and four Commissioners appointed by Republicans in Congress. In its final form, the Democratic appointees approved the report and the Republican appointees voted not to approve it. This division is

just another example of a negative consequence of the Great Recession and illustrates that even our well-informed leaders cannot agree on what went wrong.

ONLINE DISCUSSION ASSIGNMENT

The online discussion assignment described in this paper was used in six sections of Money, Banking, & Financial Markets class from the fall of 2018 to the fall of 2020. Of the six sections, four were online and two were face-to-face. On the first day of class, students were introduced to the topic with brief comments from the Instructor. For face-to-face sections, this can be accomplished with a very short overview of the topic, no more than a two-minute broad introduction. For online sections, this can be done using an email/announcement in the learning management system or with a short video from the Instructor. The brief introduction is important to draw students' attention to the assignment and to get them interested in the topic and the class.

Required Student Preparation

It is imperative that students read/study the required materials for the discussion assignment. If they don't, their comments will reflect their lack of preparation. Whatever textbook is used, it will likely include some information on the Great Recession. If this information is not in the first chapter, it will still need to be read/studied for this assignment. The text used by the Instructor for this course was Money, Banking, and Financial Markets, 5th and 6th eds. by Cecchetti and Schoenholtz. This particular text covers the topic well in the first chapter.

An in-depth study of the topic is not necessary for the assignment. It is unreasonable to expect students to spend many hours on a simple discussion assignment. But, assigning some textbook reading and a few articles does provide sufficient information for students to gain some perspective. It is also worth pointing out Step 6 of the assignment instructions. This step requires students to talk with someone they know that was impacted by the Great Recession. This step in particular often causes students to make discussion posts that are very interesting to the class and helps to address the cognitive presence issues discussed in section 2.2 of this paper. The actual Discussion Assignment Instructions are included here as Figure 1.

Student Participation

The assignment may be done as a bonus assignment or as a required assignment for the class. In my experience, participation is slightly better if the assignment is required and if the grade for the assignment is more than nominal for the class. In other words, students will be more likely to do a good job on the assignment if it affects their grade significantly. Making the assignment due within a couple of days encourages students to engage the material and each other. This encourages a social presence as discussed in section 2.2 above. There is a negative consequence of making the assignment required on the first day of class, and making the due date before the next day of class (or due in an online class section within the first few days). This negative consequence is that some students register for class after the first day and may not be in class until the assignment is past due. This creates challenges that each Instructor should consider when deciding how to use the assignment.

Some information that illustrates what is expected should be provided by the Instructor. The assignment instructions shown in Figure 1 above accomplish this by describing a Quality Post and indicating the likely grade based on students' performance. I intentionally avoid providing an example because I have found that some students copy the example and post it as their own. This would defeat the purpose of the assignment and diminish its value.

Finally, it is very important to point out that students should be required to make their first post prior to being able to see the posts of others in the class. This eliminates, or at least reduces, the issue of having students simply copy the words or ideas of others in the class when making their first post.

Figure 1: Discussion Assignment Instructions

Money and Banking Module 1 Discussion Assignment

The purposes of this assignment are as follows:

* to consider the importance of the financial system
* to consider various parts of the financial system
* to gain an understanding of the consequences of a failure of the financial system

Consider these broad questions: Who is really to blame for the Great Recession? Was it 'government', the FED, Wall Street, Mortgage Lenders, Commercial Bankers, Bond Rating Agencies, or maybe even Consumers?

To complete this discussion assignment, you must do the following:

Step 1: Read chapter 1 of the textbook while paying particular attention to the sections on pages 2-8 that provide information on the Great Recession.

Step 2: Review the text material covering the Great Recession (listed in the Index under 'Financial Crisis'). There are several sections listed in the index on page I5-6 that address various issues related to the Great Recession.

Step 3: Read the article ***Financial Services Modernization Act of 1999***
https://www.federalreservehistory.org/essays/gramm_leach_bliley_act

Step 4: Read the article ***Glass-Steagall Act: Did Its Repeal Cause the Financial Crisis***
https://www.toptal.com/finance/investment-banking-freelancer/glass-steagall-act

Step 5: Read the article ***Fannie Mae Eases Credit To Aid Mortgage Lending***
posted in the Discussion folder.

Step 6: Talk with someone you know that was impacted by the Great Recession and ask them to share their opinion on what the cause(s) were.

Step 7: Enter Module 1 Discussion and post based on the following:

- Your First Post - should describe how you feel about the issue. Who do you think is most to blame for causing the Great Recession? Why?
- Your Subsequent Posts - should respond to other posts from the class.

Keep in mind that 4 Quality Posts are required for this assignment.

A Quality Post demonstrates that you have read the articles, formulated an opinion, presented your opinion in a professional manner, and responded to others professionally regarding their posts.

- With 4+ Quality Posts, you will likely earn a grade of "A" for the assignment.
- With 3 Quality Posts, you will likely earn a grade of "C" for the assignment.
- With 2 Quality Posts, you will likely earn a grade of "D" for the assignment.
- With 1 Quality Post, you will likely earn a grade of "F" for the assignment.

ANALYSIS OF DISCUSSION POSTS

122 students made a post for the assignment over the six sections analyzed for this paper. 12 of these were not used due to the poor quality of the posts. Essentially, 12 students obviously did not read the required materials and their posts were of no value.

After eliminating 12 poor quality posts from the sample, 110 remained. 69 of these attributed the primary cause of the Great Recession to a single thing/category. 18 students could not limit the cause to a single category and chose 2 categories. For this study, both choices were counted for these students. Finally, 23 students attributed the cause to 3 or more categories. The result is that the summary below shows n=128. This is 69 + (2x18) + 23 = 128 in Figure 2.

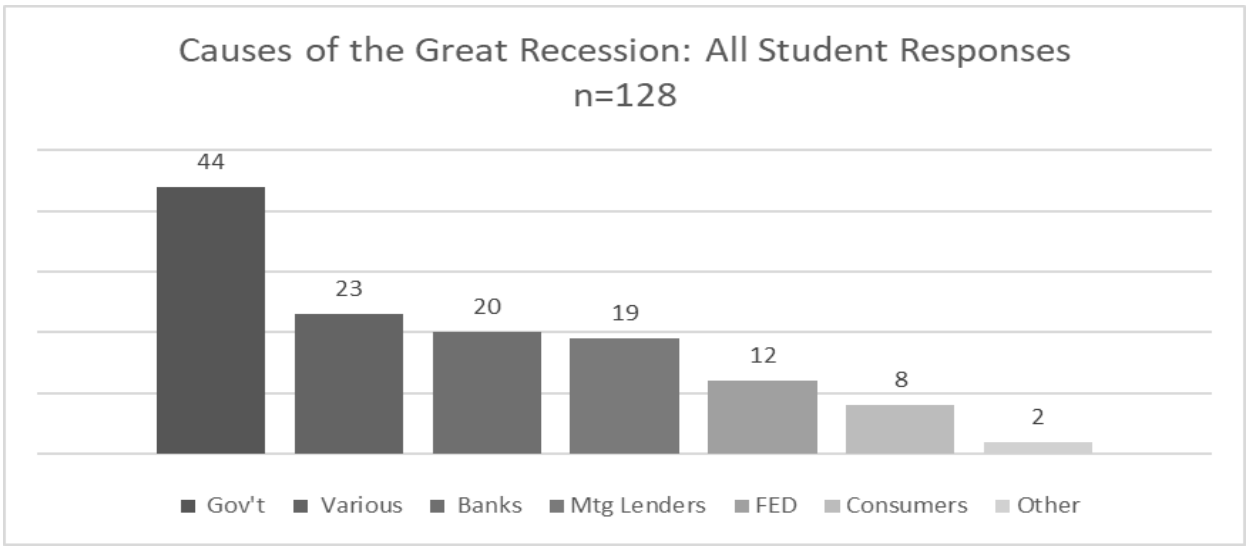
Summary of Student Posts

Figure 2 shows that students believe the greatest responsibility for the Great Recession lies with Government. The responsibility of banks, mortgage lenders, and even consumers are significant, but less than that of Government according to students. Specifically, 44 + 12 = 56 students attribute the cause of the Great Recession to Government or the Federal Reserve, while 20 + 19 + 8 = 47 students attribute the cause to banks, mortgage lenders, or consumers. But, this basic breakdown of student responses does not capture the information in the Various category.

The Various category represents 23 students who attribute the cause of the Great Recession to 3 or more categories. In other words, these students find fault with many parties in the financial system. This is similar to the FCIC report discussed above.

Further analysis of the comments from students who attributed fault to the Government plus Various categories reveals another interesting issue. Overall, there were 44 students who identified Government and 23 who identified Various as responsible for the Great Recession. 34 of these 67 students specifically mention Bill Clinton or the Clinton Administration as causing the Great Recession. 10 more of these students specifically identify the repeal of Glass-Steagall and/or the loosening of Fannie Mae's lending standards as significant causes.

Figure 2: Student Views of the Causes of the Great Recession



Student Comments on the Topic of the Causes of the Great Recession

Student quotes from the posts were selected for each category to demonstrate the overall views of students. Overall, these comments reflect the high quality of students' work on this assignment. These are Quality Posts, as required by the assignment instructions. These quotes demonstrate that the students have read the assigned material, formed an opinion, and made their posts using professional language. These selected student quotes are shown here in Figure 3.

Figure 3: Student Quotes on Specific Causes of the Great Recession

Category:	Student Quote:
Government	"I have come to the conclusion that the **federal government** (Legislative and Executive branches) ... are mostly at fault for the financial crisis." "I would say that the principal responsible...is...**President Bill Clinton** and his administration. The absence of Glass-Steagall...the new rules...all these have (the) Clinton administration as (the) common denominator."
Various	"**Decades of greed in different forms**, poor planning, and loose monetary policy ... are the ultimate reasons for the Great Recession." "**Many factors** directly and indirectly caused the Great Recession ... I do not believe the blame can be placed on one person or entity."
Banks	"I feel that the Great Recession was a cause of greed within corporate America. **The banks** were extending loans to individuals that didn't have the means to repay the debt bud did it anyway..." "I believe the blame falls most heavily on the **financial institutions**.... (which) lowered their requirements for loans."
Mortgage Lenders	"**Mortgage lenders** are the majority of who is at fault for the Great Recession. Fannie Mae ... eased the credit requirements..." "**Mortgage Lenders** being paid based on how many loans they were selling ... played a crucial role to start the Great Recession."
Federal Reserve	"I think the **Federal Reserve** is the most to blame for the Recession. Their job is monitor and stabilize the economy. They should have watched closely..."
Consumers	"**Consumers** in my opinion are completely to blame for the Great Recession. I say this because if we as a society cannot take responsibility for our own choices, then we will resort to blaming the government and everyone else for our problems."

Student Comments on the Impact of the Great Recession

Section 2.3.2 above addressed the consequences of the Great Recession. As with many classroom subjects, the challenge for any Instructor is to make the content relevant. Step 6 of the assignment attempts to do this by requiring students to talk to someone they know who was impacted by the Great Recession. The vast majority of students in the six sections are traditional students, aged 20-22. Typically, these students talk to their parents about the Great Recession and what was happening to them at that time. Many students relate financial and emotional difficulties. They often indicate that someone they know lost their job, lost their home, or suffered some other significant financial loss.

This aspect of the assignment illustrates how it resonates with students. It addresses the issue of making the content relevant and it makes studying history personal. It "...allows students to see themselves in history (and) puts their own lives and people they know at the center of what can feel detached and distant" (Ujifusa, 2020). Some student quotes are shown below, in Figure 4, to demonstrate how students communicated their personal and/or family experiences related to the Great Recession in their discussion assignment posts.

Figure 4: Student Quotes of Family Experiences During the Great Recession

Theme:	Quote:
grief and financial problems	"The Great Recession was something for me to remember, my family was hit hard from it. The Great Recession...lead to a lot of **grief and financial problems** for my family."
I was only in the 4th grade	"At the time of the Great Recession **I was only in the 4th grade**. The first time I actually heard of the Great Recession and the impact that it had on the housing market, I was a freshman in College. I didn't know that this was a big issue at the time."
seeing my parents	"I can recall...**seeing my parents** do everything they can to keep afloat. While taking a look at the textbook and the readings provided, I was finally able to learn more about what occurred years ago."
how bad it was for their parents	"Sometimes I hear people discuss **how bad it was for their parents** and families during the Great Recession and I wonder why I didn't experience what they did."
filed for bankruptcy	"...when the financial crisis of 2008 occurred...my parents...owned their own business. They were hit hard by the economic downturn. Three years later, they were forced to close down this business...I watched my parents...who spent their life savings into a business, in just six years, lose everything and **filed for bankruptcy**. They still deal with the effects to this day."
lost over $100,000 in value	"I spoke with my father about the effects of all this on him personally and his home **lost over $100,000 in value** in nearly a year back in the Great Recession."
2009 was the worst	"I talked to my...grandpa who is a real estate broker and he told me that **2009 was the worst** for his career. He said that no one had the confidence to buy after all that went on."
turned down several good job offers	"My brother bought a condo in... Florida in...2007. He paid $242,500... The value of his condo ... dropped to $120,000 by the end of 2009. ...he believes the mortgage lenders were to blame. ...the lenders wanted zero down and asked very little questions. ...over the years he **turned down several good job offers** in other states because he was upside down in his condo."
times were tough	"...my father being in the car business and my mother being in the housing business, both were affected...**times were tough** and they had to cut some privileges out just to make it."
Little did I know	"When I think back to 2008, I think of grade school, playing on the playground, after school snacks, and Lego blocks. When talking to my dad, he had very different feelings. **Little did I know** I was living through my family's near fate of bankruptcy."

FACULTY FEEDBACK AND ASSIGNMENT FOLLOW-UP

Providing feedback is very important to student success (Dennen, Darabi, & Smith, 2007) (Van Wart, et. al., 2020). For online courses, individual feedback that includes the name of the student builds rapport with the student. In my experience, students often report that personalized feedback is not common in online classes and they respond positively to personalized feedback when it is given. In addition to using the student's name in personalized feedback, it is also beneficial to address a specific comment made by the student in their post. Again, this builds rapport with the student and that can be beneficial for increased student success.

For face-to-face classes, the feedback may be more generalized in the next face-to-face class period. This allows the Instructor to provide broad, and positively reinforcing, comments about the assignment and overall student participation.

Regardless of the method of delivery, online or face-to-face, it is important to summarize the topic so that students have a fair understanding of the facts. Since this assignment was created for a Money, Banking, & Financial Markets class, students should understand from this assignment that the financial system is interconnected. They should begin to see how all of the parts of the financial system rely on the other parts. The basic question of the assignment is – who do you think is most responsible for the Great Recession? Coming up with a 'right answer' to the assignment question is not realistic. It serves no good purpose to tell students that their opinion is wrong. Instead, an overview of the FCIC report can be used to briefly illustrate the complexity of the topic and the challenges related to assigning blame or responsibility.

LIMITATIONS

No assignment is perfect. There are many ways to address the Great Recession in a Money, Banking, and Financial Markets class. This assignment uses a few articles that include content not found in a typical textbook used for this class. This is intentional and is an effort to present different views of the topic. However, it is possible that students' views, as expressed in their discussion posts, are influenced by the selected readings assigned. This, of course, should be addressed in the Instructor's follow-up for the class on this assignment.

SUMMARY

The online discussion assignment analyzed in this paper allows students to learn not only by studying a topic relevant to the class, but also by making the topic relevant to their own experience. Of course, the causes of the Great Recession are vital for students to learn, to avoid making the same mistakes in their future. It can be challenging to cover the topic fully, along with all of the other course content. Nevertheless, assigning the online discussion allows the Instructor of a face-to-face class to cover the topic without having to take up significant class time. It also allows the Instructor to introduce the elements of the financial system to the class in an introductory and non-threatening way for both online and face-to-face classes. This topic is also relevant for classes around the world, given that the Great Recession had global impact.

The overall purpose of this paper is to relate a method of teaching, using a discussion assignment that can enhance student engagement and increase student success. Over the six classes used for this study, student participation in the discussion assignment was very high and the quality of student posts was also very good. This has proven to be a very good introductory assignment to engage students.

The posts analyzed for this paper were the initial posts only. However, it is worth mentioning that the subsequent posts have generally been of very high quality as well, indicating a high level of student engagement with other students and with the topic.

The Great Recession is a very good topic to use to introduce a Money, Banking, and Financial Markets class. The topic allows the Instructor to demonstrate how the financial system is highly integrated and how the catastrophic failures within the financial system impacted the lives of these traditional students and their families. Several students' comments indicate that their knowledge of their family's circumstances during the Great Recession was very limited. This assignment allows students to see themselves and others they know in the center of history, making the assignment relevant to them personally.

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Purchasing Cycle Case: Systems, Accounting, and Business Issues

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ABSTRACT

This case focuses on the purchasing cycle and ERP system issues by first examining a straightforward purchase-to-pay example and then delving into more complex issues. You may have heard the term, "best practices." ERP systems are programmed for best practices. This case provides two examples of the accounting, systems, and control implications when a company employs a process that differs from the "best practices" for which the ERP system was configured. In addition, the case examines management decisions around sole sourcing or using multiple suppliers for a key raw material and it examines the management issue of how to reward (bonus) purchasing department personnel (buyers).

Keywords: Purchasing Cycle, ERP systems, Purchase Returns, Consignment, Foreign Currency, Sourcing

INTRODUCTION

MDM manufactures complex medical devices. Manufacturing takes place in two states and in Europe. Much of the purchasing and technical manufacturing takes place at a plant in NJ. Midway through production, a critical subcomponent is shipped to a European vendor (EUR) to be chemically coated. The coated component is then returned to NJ where the component is finished. The technical components are then shipped to PA where the medical device is assembled. Like most manufacturing entities, MDM uses a standard costing system.

This case examines the following issues.

1. The purchase-to-payment cycle from ordering the raw materials all the way through the payment to the supplier for a standard purchase order (PO) and also a blanket purchase order (BPO).

2. The case then examines some specific situations that MDM encountered that impacted the ERP information system
    a. A consignment inventory arrangement with one large supplier
    b. Foreign currency transactions and foreign currency risk sharing

3. And finally, it looks at two management decisions relating to purchasing
    a. The pros and cons of sole sourcing raw materials with one vendor versus spreading the business across multiple vendors
    b. MDM primarily rewards (bonuses) its buyers based on the amount of its (favorable) Purchase Price Variance.

THE PURCHASING CYCLE

The sales forecast is the primary basis for determining quarterly purchasing and production levels. Purchase Orders (POs) can be triggered in two ways. They can be generated automatically in Oracle (the ERP system) when raw material inventory levels dip below a pre-specified quantity or Purchasing could receive an electronic purchase requisition from the appropriate individual in Manufacturing or the Stockroom. The requisition indicates the quantity, description, and timing of the materials that are needed. Purchasing then obtains competitive bids from suppliers and orders materials. Managerial approvals are required for orders over a certain dollar value. This is a typical setup at most manufacturing entities and MDM has no problems with accurate and timely PO's.

MDM rates each of its suppliers for quality. For its "A-rated" suppliers, raw materials arrive and are moved directly to the Stockroom ("Dock-to-Stock"). Otherwise, raw materials come to the Receiving/Inspection department where they are counted and inspected. Sample counting/inspecting (vs. 100% counting/inspecting) is allowed for "B-rated" vendors. If there are no problems, the materials are transferred to the stockroom.

If materials fail inspection, they are returned. Receiving personnel notify the appropriate buyer in Purchasing. The buyer contacts the vendor and obtains an RMA# (Returned Material Authorization number). The vendor must be notified before units are shipped back to them or they will not accept them. Receiving/Shipping then repackages the materials, completes the paperwork, ships the units, and records the return information in the ERP system.

Blanket Purchase Orders with Supplier Asia1

MDM performs its sales forecast for a year. They then negotiate a pricing structure with major suppliers like Asia1 guaranteeing a certain minimum purchase quantity with a slightly higher expected quantity. While standard purchase orders can be used for most purchases an organization makes, for large, ongoing purchase agreements, using blanket purchase orders (BPOs) can streamline the purchasing process and benefit MDM by locking in favorable pricing and other terms over a specific period of time.

The blanket purchase order includes:

- Duration of agreement. (for MDM it was quarterly)
- Pricing and contract terms.
- Billing information – how the vendor will submit invoices for payment.
- Item specifications including expectations of quality, size, and quantity.
- Delivery quantity, times, and locations.
- Cancellation clause

Requests for inventory are made periodically against the blanket order; As units are received MDM "releases" materials against the blanket order. Asia1 sends invoices to MDM for units that were delivered ("released"). When one blanket PO was completed, another one would be negotiated. MDM experienced a problem due to a timing issue with defective units. Defects would often be detected in the quarter after the units were received. So, when the defective unit was returned it had to be applied against the correct (previous) BPO. There was a high volume of defects (this was cutting edge technology that only MDM used), so this was an ongoing issue. MDM, and its supplier, Asia1, had to maintain careful recordkeeping as a result. A further complication is that ERP systems, such as SAP and Oracle, are set up to automatically process credits when inventory is returned. Credits reduce the amount owed in Accounts Payable, but the arrangement with Asia1 did not work like that. MDM was required to take replacement units, not dollar credits for its returns.

MDM could not test the boards until they were placed into production, so defects were not detected upon arrival. The reliability tests occurred at an early stage of production, but not immediately. MDM's tests were designed to look for known, past defects. The tests were very good, but not perfect. Defective boards still surfaced later in production because new defects surfaced. Disputes could arise because production had occurred—was the defect due to something MDM did or was it a problem with what Asia1 did.

Exercise: Accounting Journal Entries and Systems Issues

Assume Purchasing placed an order for 100 units of raw material ABC123 for $2.00 per unit from Vendor XYZ.

1. Record all journal entries from the order up through the payment to the vendor.
2. Who is making each of these entries? What events triggered the entries?
3. Is any non-accounting information being entered into the ERP system? If so, explain what it is.
4. What paperwork is involved ("paperwork" can be a physical, hard-copy or electronic)?
5. What errors could occur? What controls would be useful to minimize the risk of errors?
6. What non-accounting transactions are being entered into the ERP system?
7. What changes in processes and accounting, if any, result from BPO transactions?

CONSIGNMENT ARRANGEMENT

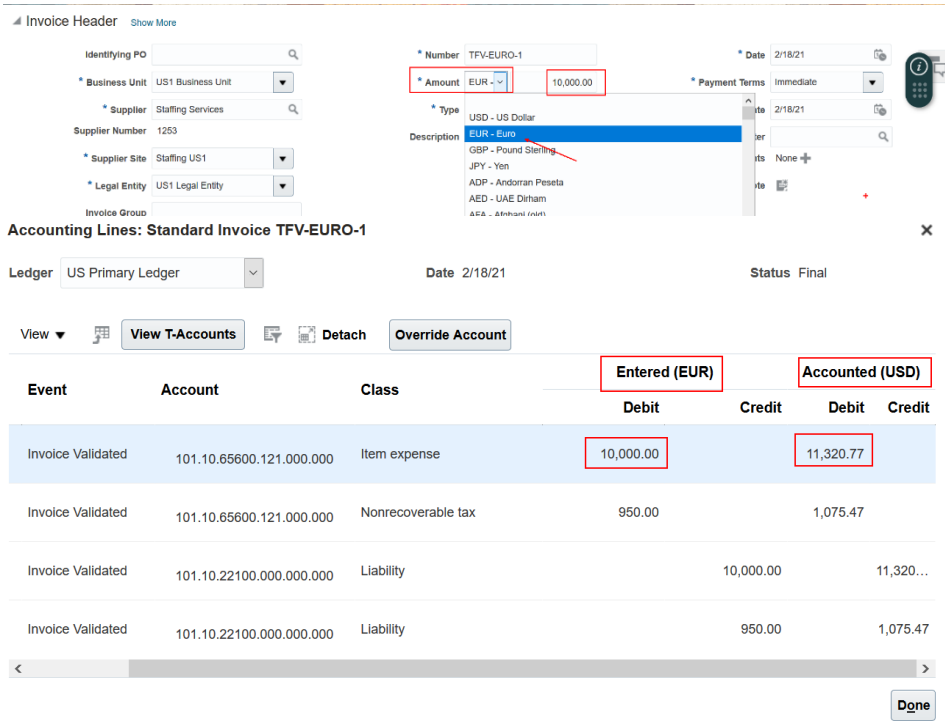
One important and very expensive raw material was purchased on consignment. How would that arrangement change the systems, internal controls, and accounting journal entries from your answer above?

This raw material (think of it as something like a circuit board) was sometimes defective. In fact, in a batch of 100 it would not be surprising if 20 of the items were defective (the normal defect rate was closer to ten percent, but 20 percent occurred). What procedures are needed to effectively monitor and control purchase returns?

Who do you think approached who about the consignment arrangement? What are the pros and cons for each party in this type of arrangement?

FOREIGN CURRENCY ISSUES

The vast majority of MDM's purchasing arrangements were in U.S. dollars (USD). Some were in foreign currencies. In those few cases, MDM bore the foreign exchange risk. What are the accounting, system, and control implications for transactions denominated in a foreign currency? Actually, there is minimal impact on the above. Oracle, for example, allows you to load the rates/rate types as you need to with a delivered spreadsheet load, but most customers subscribe to a web service that automatically passes the FX updates to the cloud on a daily basis. The screenshot below shows the clerically entered amount of euros from the invoice (EUR) and the USD equivalent is automatically provided by the ERP software.



What will be the journal entry for the payment of this invoice in 30 days? (record your answer for class discussion)

In one arrangement with a major foreign supplier, MDM and the supplier agreed to split the foreign currency gains and losses. How would this decision impact MDM's systems and controls? (write out your thoughts for class discussion)

Decision on Sourcing Raw Materials

MDM purchased the raw materials (RM) mentioned in the BPO scenario from two suppliers, Asia1 and Asia2. MDM purchased a majority of this critical, and expensive, raw material from Asia1 initially. Asia2 was a less well-known company and it supplied the RM at a lower price. Asia2 quickly improved its manufacturing processes and it supplied a superior product at a lower price. Asia1 continued to have quality problems, so there were more returns with Asia1. What should MDM do? Should they go with one supplier or stay with two suppliers? List your pros and cons and make your decision and be prepared to discuss in class.

Compensation Issue-Purchasing Department

Purchasing is an important department at MDM. Buyers receive a base salary and a bonus. How would you determine the bonus for a buyer? Would you use a quantitative/formula measure, or would you consider qualitative factors, or both?

MDM bonused its buyers based upon the Purchase Price Variance amount. What are the pros and cons of using this variance as a performance measure?

The Teaching Note is available from the author at Robert.west@villanova.edu

Analyzing Distance Learning During COVID-19 To Innovate future Course Delivery

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ABSTRACT

Higher education experienced an extreme disruption from the COVid-19 pandemic which highlighted the necessity to examine teaching modalities and accommodate a broader range of student learning needs. These realizations inspired a case study for three courses at a University in Philadelphia during the Fall 2020 semester. The goal was to investigate student learning motivations during the pandemic and provide further insight about the value of these distance learning models to support the future of higher education course delivery. The study did find a high degree of anxiety surrounding virtual learning. Still, it unveiled meaningful opportunities for universities to explore this modality in addition to course curriculum optimization to better serve the next generation of learners. Creating the proper technological infrastructure, university resources, and socialization around hybrid and HyFlex modalities, in particular, will improve the overall perception of them.

Keywords: COVID-19, Distance Learning, Hybrid, HyFlex, Nexus Learning, Pandemic, Socialization, Student Motivation, Student Engagement, Virtual Classroom

INTRODUCTION

Students have undergone a tremendous change due to the shifts in learning modalities over the past year. The COVID-19 crisis has forced school closures in 188 countries, heavily disrupting the learning process of more than 1.7 billion people (OECD, 2020). Higher learning institutions were obligated to adapt and take most class sessions to digital spaces. The main issue is educating with the same kind of zeal for content while learning new digital space practices. Other matters included adapting students to socialization strategies through distance learning and teaching them how to learn in a virtual space. Instructors have become accustomed to the traditional learning styles where the student sits through lectures, asks questions, and has a mix of in-class and homework assignments. Blended learning models have become the leading education model of choice, infusing different Learning Management Systems for sharing content and assessing student learning progress. Hybrid learning modalities have also been used in the classroom since the late 1990s with the expansion of the internet. Understanding the benefits and opportunities of these modalities are essential in assessing how universities will move forward after the current pandemic.

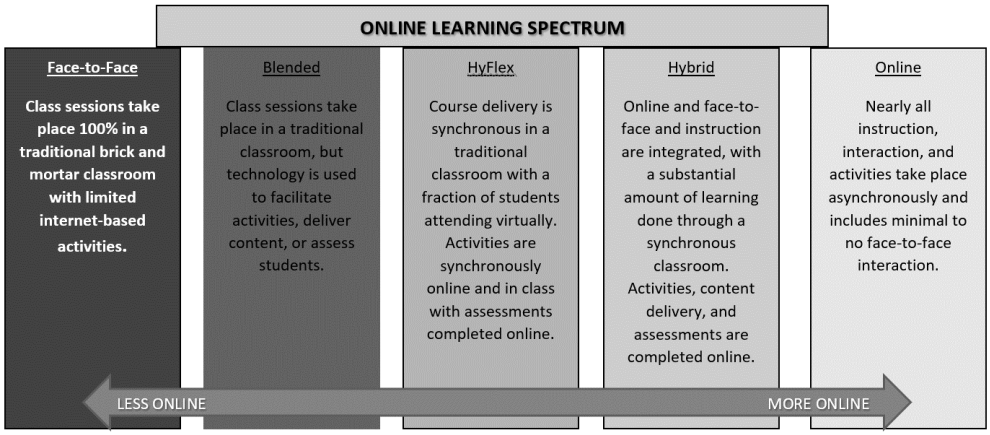
There has also been a decline in students enrolling in higher education, arising even before the pandemic forcing educators to shift degree styles and formats. According to a report from the National Student Clearinghouse Research Center, there has been a steady decline from 1.4% to 2.5% since 2016, with the most significant decrease in the Fall 2020 school year (National Student Clearinghouse Research, 2020), partly due to the accelerated lifestyle of current students and their attitudes towards higher education. In response, universities began designing three-year bachelor's degrees, one-year master's degrees, and certificates instead of degrees altogether to expedite their journey from education to the workplace. Hybrid and HyFlex learning modalities support these approaches as well because it customizes the experience to fit student needs. The survey questionnaire found students' attitudes towards hybrid learning are primarily neutral but require synchronous learning over asynchronous. Therefore, flexibility is accomplishable through the hybrid learning and HyFlex learning models. Upperclassmen learners are more applicable to these distance learning models because it allows them to engage in off-campus activities, including internships and employment.

TRANSITIONING TO THE DIGITAL SPACE

The average age of instructors in American universities is 55 years old. A generation on the novice stage of technology adoption because of their limited exposure to technology and engaging in online spaces in their developmental years. It is also safe to assume this generation of instructors do not value virtual learning the same way they value in-class traditional learning modalities because educators did not widely use it in the modern

classroom until the early 1990s. The hope for this paper is to educate this generation on the value of these modalities. The survey concluded that 67.4% of the students are first- and second-year students, an average of 18 – 20 years old. This generation is more likely to have access to technology early in their developmental years and expect technology in the classroom. However, according to this case study, they also do not have a positive perception of online asynchronous education as they value traditional in-person instruction. A study from Pearson mentions: Although GenZ is considered *Digital Natives* and bypasses conventional learning methods, many still value printed materials and teacher interactions as part of the college experience (Beyond Millennials: The Next Generation of Learners, 2018). Gen Z students believe instructor interaction is generally very significant to their learning and development. It has become more evident that students on the graduate and undergraduate levels have unlimited access to information from all industries but cannot process and apply it independently, grounding the need for an educator to support further interpretation. For this reason, it has taken a considerable amount of time for universities to convert to fully online instruction. The common ground, however, can be found in HyFlex and hybrid virtual learning modalities. Below is a spectrum of learning modalities based on the level of online learning taking place between student and instructor.

Figure 1: Adapted from "An Introduction to Hybrid Teaching"



Even though, in 1993 the internet was made widely available to most public schools and universities, some traditional universities have not considered a fully online education until as recent as 2013, twenty years later. In the first decade of online learning, colleges' growth spurt forced many traditional higher education institutions to play catch-up over the past decade (Clark, Noone, Selingo, and Wittmayer, 2021). By 2018, 98% of traditional colleges and universities offered some sort of distance learning in response to the growing number of students seeking flexibility in course delivery. According to the Digest of Education Statistics, 35.3% of students incorporated at least one distance education course by 2018 (NCES, 2020). Just three years later, the COVID-19 pandemic shifted most traditional in-class instruction to the hybrid learning and HyFlex learning modalities.

VIRTUAL CLASSROOM ASSESSMENT

The biggest reason for the immediate learning disruption is that institutions and students alike are not well versed in the impact of such a virus on the individual and the atmosphere. This forced school closures to stop the spread of the COVID-19 virus. According to the United Nations, Educational, Scientific, and Cultural Organization, COVID-19 affects 208,848,445 learners, which amounts to roughly 12% of enrolled learners with 28 country-wide closures (UNESCO, 2020). The first closures occurred in China in early March 2020. At the height of the closures, 23 countries were implementing nationwide closures, and 40 were implementing local closures, impacting about 47% of the world's student population (UNESCO, 2021). This survey consisted of 122 students across three different academic study levels and diverse backgrounds to analyze student responses to various teaching modalities and help educators make informed decisions about supporting students during and after the pandemic. COVID-19 is the third severe epidemic caused by coronaviruses in the past 20 years. In 2003, Severe Acute Respiratory Syndrome (SARS) caused China to close educational facilities nationwide. During this time, technology access posed similar challenges as it does today because the average home did not have access to the internet and properly functioning learning technology devices. It is not surprising also to understand there is a lack of accessibility for those in lower-income homes. Almost two decades later, students are facing the same accessibility issues. According to this case study, 70.6% reported accessibility issues, including internet connectivity and device malfunctions, with 48.7% of

the students living in homes with household incomes less than $100,000, and 32.7% of students have disruptive learning environments outside traditional in-class instruction.

Table 1: Accessibility Issues Among Students

Have you had any accessibility issues? (i.e. internet connectivity, laptop or device malfunctions, etc) (119 Responses)	
Yes	32.8%
No	29.4%
Sometimes	37.8%

Table 2: Household Incomes Levels of Students

What is your household income level? (119 Responses)	
Less than $25,000	10.9%
$25,000 - $44,999	12.6%
$45,000 - $100,000	25.2%
$100,000 - $149,999	12.6%
$150,000 - $199,999	7.6%
$200,000+	6.7%
Unsure	24.4%

This study includes students mainly from three courses implementing these pedagogy methods and the Nexus Learning theories, the core of Thomas Jefferson University's education model. Instructors incorporate industry-based approaches and hands-on activities, merging instruction with real-world projects (Jefferson.edu, 2020), including industry partnerships, case studies, and real-world problem-solving. *Global Fashion Insights* is a course made up of first-year students, introducing them to the fashion supply chain and the business of fashion. *Fashion Immersion* is a course dedicated to exposing the students to different retailers, manufacturers, and key roles throughout the fashion value chain. *Visual Merchandising* is a course of upperclassmen engaging in merchandising strategies in an omnichannel retail environment. Of all of these courses, both the *Fashion Immersion* and *Global Fashion Insights* courses are the better candidates for traditional instruction. *Visual Merchandising* is a course more applicable to the hybrid and HyFlex modalities. These are the classes used to analyze the parameters outlined in the thesis for this study.

HyFlex Synchronous Course One (Global Fashion Insights)

Students have a term project implementing supply chain strategies and present a line of products at the end of the semester to a panel of industry professionals. The course structure is set up as approximately 45 minutes of instruction and 45 minutes of breakout sessions. During the pandemic in Fall 2020, the course shifted to a HyFlex model. The class was split with some students and one professor on campus and one professor and some of the students learning virtually. Instruction and activities were completely synchronous with asynchronous assessments requiring the students to be self-directed in developing the value chain and the products associated with it. HyFlex's proven success in this course included flexibility in accommodating distance learning, creating deeper connections with professors, and developing a creative approach to completing a project.

Students were able to develop peer-to-peer relationships by completing different assignments together and bonding through the coursework regardless if they were virtual or in the classroom. During the breakout sessions, the professors actively engaged with the student groups to answer questions and assist them throughout different project phases, further developing the professor to student relationship. Finally, because the class was a blend of online and in-class experiences, students gained a real supply chain experience, because different roles in the industry operate simultaneously in other geographic locations. A similar study in the Australian Journal of Teacher Education was consistent to these findings stating that a strong learning community is created through professors' abilities to meet the needs of individual learners, working to provide increased social interactions for students in an online setting, and acknowledging that online learning is not one-size-fits-all for students (Huss, Sela, and Eastep, 2015). Once more professors recognize this, they can remove the barriers that distance learners face while in hybrid and HyFlex learning settings.

HyFlex Synchronous Course Two (Fashion Immersion)

This course consists of sophomores studying critical aspects of the concept and design process, product development, production, and merchandising. The course has a term project where they work with an industry partner to develop a product line extension, taught with a mix of online virtual sessions and on-campus sessions, alternating the modalities every one to two weeks. Each session included speakers across the many platforms in the industry. It did sacrifice some on-site industry experiences for virtual presentations. But the course was able to incorporate learning on a global scale. Lectures included industry representatives from Switzerland and Los Angeles. Though the course is very innovative in exposing the student to the industry's real-world, this semester confirms it is essential to incorporate other virtual experiences, to bring the global industry within a more tangible reach. This additional factor of the course design provided a community of industry professionals to students, which helped keep these students actively engaged in their learning.

Students were able to forge relationships with industry professionals through mentorships. This new dynamic in the course assisted students in learning to build more in-depth and meaningful connections. Some of these students even noted they plan to remain connected with those industry professionals once the semester concluded. Students would have on-site visits to these companies in previous semesters but were not obligated to make the connections. The study in this class also revealed the need for more professor interaction to help students navigate the project's more complex aspects. According to the International Journal of Educational Technology in Higher Education, student engagement in online courses is strongly influenced by peer community, teacher engagement, and the structure of a course's design (Farrell, 2020).

Hybrid Synchronous Course Three (Visual Merchandising)

In the Visual Merchandising class of juniors and seniors, they enter into a learning stage where they must apply what they have learned previously. Hybrid modalities are more beneficial here because of the flexibility more applicable in this stage of learning. The class included a midterm capstone project, a final industry project, and a series of small individual sprint concept assignments. Just as in the previous courses, students were half in class, while the other half joined the class virtually for synchronous lectures. During the fall semester, the instructor introduced the capstone project to increase strategic awareness of a post-pandemic retail environment. The industry project had students working with small retailers to create an omnichannel experience aimed at a seamless experience for consumers across brick and mortar, online, and mobile retailing. All of the coursework in this class incorporated Nexus learning strategies to heighten the learning experience by solving "real-world" problems. Students worked in groups for the midterm and final projects composed of both virtual and in-class learners. Successes in the course in Fall 2020 included building partnerships with industry professionals due to the course study's flexibility. Most retailers were able to dedicate additional support to projects because the course was HyFlex. They could join the class and give real-time feedback virtually from their retail location and at their convenience.

KEY ELEMENTS TO SUPPORT HYBRID SYNCHRONOUS AND HYFLEX LEARNING

A critical element in this using virtual learning modalities is infusing technological skills for a better "real-world" learning experience. By implementing synchronous hybrid learning to bridge the gap between online and in-person learning modalities, synchronous hybrid learning improves communication through dynamic interactions, supports knowledge and social competencies, and offers multiple perspectives through immediate student-student and professor-student feedback (Priess-Buchheit, 2020). It will enable students to learn remotely, eliminating the threat of gaps in education. These gaps could result from medical issues other personal matters.

Flexible Teaching and Learning

In each of the above cases, professors could incorporate flexibility into the learning experience by engaging students in new ways. Flexibility included fine-tuning the education to highlight a more in-depth analysis of the key concepts, which created students' opportunity to capture some ownership in the content delivery and application. Students can also be more efficient in their experience and have the flexibility of time. Time to travel from class to work, find a suitable learning environment to study, and seek additional support from their educators as needed. Flexibility with the decreased burden of one-on-one interaction through virtual connections will become less intimidating but more advantageous. The era of self-service came almost simultaneously with the swift adoption of internet-based processes across all industries. As universities fight to maintain high student retention, self-directed content delivery and flexibility are necessary. Furthermore, students are accustomed to communicating online with the rise of social networks, there are an estimated 98% of college students are on one of the many different social platforms (Renee, 2019). College-age students stand out for embracing a variety of media and using them frequently. Some 78% of 18- to 24-year-olds use Snapchat, and a sizable majority of these users (71%) visit the platform multiple times per day. Similarly, 71% of Americans in this age group now use Instagram, and close to half (45%) are Twitter users (Anderson and Smith, 2018). Socialization is the crucial aspect of alleviating pain points in altering modalities in the pandemic and beyond.

Reach Remote Areas

Providing networking experiences where the global workplace is converged into the classroom broadens the student's perspective. It strengthens their ability to exchange knowledge in places and different circumstances where they may not have had the same access. Learning from home or a different off-campus location is also an added feature of hybrid learning. It provides an opportunity for the university to offer other learning options, which will

increase student enrollment and ultimately the university's profitability. Connecting with students virtually in varied circumstances gives differently-abled students an opportunity they would have limited access to in the past. Access to higher education through hybrid and HyFlex learning modalities will provide them with the flexibility they need without the cumbersomeness of traveling to a classroom. The modalities allow universities to pursue a more diverse and inclusive student body. Distance learning also provides a solution for overcrowded classrooms instead of unnecessary architectural expansion in response to the pandemic that has forced limited occupancy in indoor spaces. These funds can be better appropriated to curriculum development, technical student support for students, and educational resources related to hybrid and HyFlex learning.

Hybrid and HyFlex learning allow the flexibility of having an on-campus experience without the added costs associated with housing. It is common knowledge of the rising costs of acquiring higher education. The pandemic also magnified financial hardships across the United States due to abrupt closures and limited access to many businesses. Specifically, in Philadelphia, it is reported that 150,000 workers, or about 21% of the total workforce, filed for unemployment along with over 17,000 small businesses, or about 63% of the city's small businesses, all impacted by the Covid-19 pandemic (Rhynhart, 2020). These modalities will alleviate the pains of some of these costs and allow additional opportunities for struggling students to continue their education beyond the pandemic. Universities will also benefit because hybrid and HyFlex learning modalities will reduce the recent national declining enrollment pains.

Familiarizes Educators and Students with Modern Technology

One of the most significant resolutions of operating in the virtual space is utilizing modern technology inside the classroom. The theory of Technology Enhanced Learning, placed alongside traditional lectures, seminars, and functions, complements core learning (Dunna and Kennedy, 2019). Both the educator and the student are challenged with discovering new ways to present information for lectures and classroom projects. Learning Management Systems (LMS) will also follow suit with optimizations in technology to support the classroom experience. For example, when students submit assignments in an LMS, like Canvas, the professor can connect those submissions to a social platform, like Portfolium, increasing the student's ability to network virtually. Portfolium is a social platform where students can interact with other students from different academic disciplines to view their accomplishments and projects. Students can also interact with each other and give peer critique, accolades, or leave general comments. The more students engage with different technology programs, the more they will develop transferable technology skills for their future roles, which already uses various shared virtual workspaces, not egregiously different from what they use during their college career. Many systems in the industry are for the sole purpose of communicating and sharing data and processes. Educators also gain the skills necessary to optimize their classroom. Using these different systems allows learners to acquire independent problem-solving skills. Having access to these hybrid and HyFlex learning options thus gives universities the competitive advantage they need to persuade the next generation of learners.

SURVEY RESULTS AND ANALYSIS

The survey questionnaire's goal was to gain insight into the possible impact that virtual learning has had on students' mental health and explore what early behavioral signs of significant mental health concerns these students have been experiencing. As shown in *Figure 4*, the most common behaviors that define early signs of mental health problems reported by students were having low or no energy, with 74.7% of respondents reporting this behavior. They also reported eating or sleeping too much or too little, with 70.1% of respondents reporting this behavior. These early behavioral indicators of mental health problems may be related to what is illustrated in *Figure 5*, where 42.4% of student respondents stated online learning had hurt their overall mental health.

Figure 2: Early Signs of Mental Health in Students

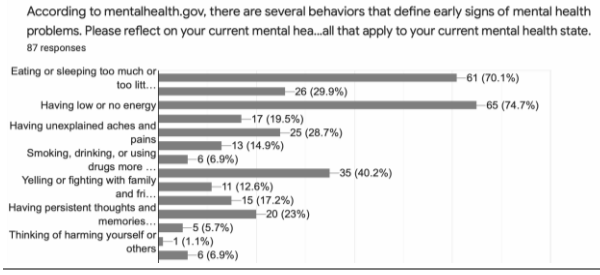


Table 3: Effect of Online Learning on Student's Mental Health

What effect has online learning had on your overall mental health? (118 responses)	
Positive Effect	16%
Neutral Effect	41.2%
Negative Effect	42.9%

Shifting the focus from students' mental health due to virtual learning during the pandemic must consider the students' angst and anxiety with the return to in-person classes. There will be negative impacts on higher education due to the long-lasting pandemic situation, with its lockdown and stay-at-home orders. There must be developments in strategies to prevent and address the mental health challenges that college students currently face and will face in the foreseeable future (Son, Hegde, Smith, Wang, and Sasangohar, 2020). Improved access and exposure to on-campus social clubs, virtual support systems, and further developing interpersonal connections with the professor will be the best improvement methods.

Based on the notion that quality and quantity social relationships affect mental health, the survey questionnaire also assessed students' ability to interact with their peers socially (Umberson and Karas Montez, 2010). The survey evaluated social relationships through exploring: (1) The overall effect of COVID-19 on the ability to interact on the college campus socially; (2) The ability to join any clubs or organizations at college; (3) Preference on types of social interactions in college (face-to-face or through a device); and (4) Hybrid learning's effect on the ability to interact with other students for classwork, group project meetings, relationship building, etc. *Figure 6* depicts 82.2% of student respondents reported that COVID-19 had hurt their ability to interact socially in college. Additionally, *Figure 7* shows that 60.5% of students reported not joining a club or organization.

Despite the risk of in-person social interactions during the pandemic, *Figure 8* highlights that 89% of student respondents reported preferring face-to-face social interactions. Finally, *Figure 9* details that 58% of student respondents said that hybrid learning had hindered their ability to interact with other students for classwork, group project meetings, and relationship building. Students' lack of interpersonal interaction in the survey questionnaire may be directed towards students' overarching negative view towards COVID-19's societal effects instead of being directly connected to their virtual learning perspective. That is why establishing a healthy classroom community is so essential when adapting virtual learning modalities after the pandemic. Adjusting to these new learning modalities can take a toll on students' mental health and the amount of stress and pressure they feel, as seen in the survey questionnaire results. Meeting in the middle through offering hybrid and HyFlex learning as options to join course lectures allows students the benefit of connecting in-person socialization virtual experiences to maintain a healthy education-work-life balance.

Table 4: Effect on Social Interactions of Students

What effect do you feel COVID-19 has had on your ability to socially interact on your college campus? (119 Responses)	
Positive Effect	2.5%
No Effect	15.1%
Negative Effect	82.4%

Table 5: Ability to Join Organizations

Have you been able to join any clubs or organizations at your college (119 Responses)	
Yes, I have joined at least 1 club or Organization.	39.5%
No, I have not been able to join a club or organization yet	60.5%

Table 6: Social Interaction Preferences of Students

Do you prefer social interactions in college face-to-face or through a device (phone, laptop, etc. (119 Responses)	
I prefer face-to-face interactions	11%
I prefer interactions through a device	89%

Table 7: Effect on Student's Ability to Interact

How has hybrid learning effected your ability to interact with other students for class work, group project meetings, relationship building, etc.? (119 Responses)	
Positive Effect	13.4%
No Effect	28.6%
Negative Effect	58%

The relationship between students' motivation and their level of focus, either online or in-person, during COVID-19 was also explored through the survey questionnaire. In *Figure 10*, over a third (35.6%) of student respondents, 42 in total, reported a motivational level of a 3 out of 5 towards completing assignments for online courses versus in-person courses. The majority of student respondents scored their motivation towards completing tasks for online courses versus in-person courses as higher, with a total of 72.9% of student respondents rating their motivation level as a 3 or higher. Similarly to motivation levels, *Figure 11* illustrates that over a third (37.3%) of student respondents rated their level of focus in their online lectures as a 3 out of 5. Once more, the data indicated that a majority of

student respondents scored their focus level in online lectures as higher, with a total of 79.7% of student respondents rating their focus level as a 3 or higher. This conclusion supported the notion that students remained motivated to learn and complete assignments on time despite the shift to distance learning approaches due to unprecedented events (Armstrong-Mensah, Ramsey-White, Yankey, and Self-Brown, 2020). The survey indicated that students' motivation and focus levels do not appear to be negatively affected by courses' virtual synchronous nature. Instead, the survey questionnaire's data skews towards indicating that there has been a positive effect on student motivation and focus levels in their online courses. The assumption herein is the flexibility these modalities create for the students.

Figure 3: Motivation Levels of Students

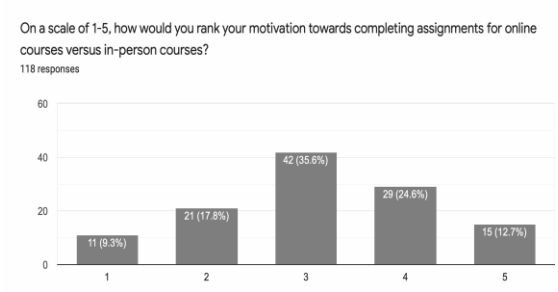
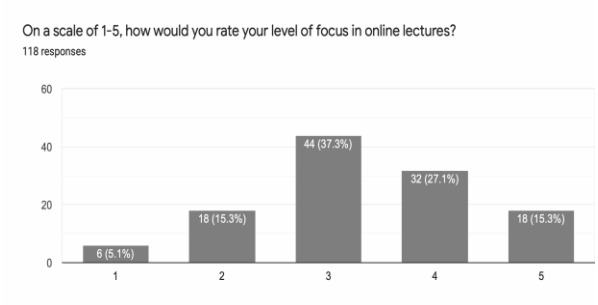


Figure 4: Focus Levels of Students



To gauge student attitudes, the survey questionnaire assessed: (1) Students' attitude towards hybrid learning, (2) Preference towards online or in-person learning environments (3) Individual camera statuses of students during hybrid virtual synchronous classes; and (4) Reasons for camera inactivity during hybrid virtual synchronous classes. *Figure 12* indicates 72.9% of students' overall attitudes towards hybrid and HyFlex learning are positive or neutral. When given a choice between online and in-person courses, *Figure 13* illustrates that 67.8% of student respondents prefer learning through in-person courses over online courses. But, discovered in *Figure 14*, 95% of students would attend a live session of course delivery after the pandemic if it were available and they could not make it in to class that day. Finally, as shown in *Figure 14*, over half (62.2%) of student respondents indicated having their cameras on sometimes for their hybrid virtual synchronous classes. Out of the written reasons why students responded "no" or "sometimes" to having their cameras on, 8 out of 61 (13.11%) responses mentioned not comfortable, and 11 out of 61 (18.03%) responses mentioned high pressure to look good or presentable. Below are examples of written responses from students explaining why their cameras are off during online learning:

- "I feel more focused with the camera off."
- "I am not comfortable on camera and feel like I'm not in a comforting learning environment."
- "Pressure of looking good on camera. Distracted by making sure I look ok."
- "I don't look presentable, but I am still paying attention."

Given these trends in student attitudes towards camera activity, there is a correlation between cameras being off and their level of comfortability and confidence in how presentable they look. The survey questionnaire revealed when students have their cameras off during virtual synchronous sessions, that does not necessarily indicate insufficient levels of attention or focus from students in their hybrid virtual synchronous classes.

Table 8: Student Attitudes Towards Hybrid Learning

What is your overall attitude toward hybrid learning? (118 Responses)	
Positive Attitude	26.9%
Neutral Attitude	27.7%
Negative Attitude	45.4%

Table 9: Student Preferences on Class Modality

Do you prefer learning online or in-person? (118 Responses)	
Online	32.2%
In-person	67.8%

Table 10: Students Willingness to Attend Online if Unable to Attend In-class

Table 11: Camera Status of Students in Hybrid Classes

Is it important for you to know that if you are unable to attend a class session live, you can join online? (119 Responses)	
Yes, it is important to me.	95%
No, it is not important to me	5%

For Hybrid Virtual Synchronous Classes, do you have your camera on? (98 Responses)	
Yes	25.5%
No	12.2%
Sometimes	62.2%

SOCIALIZATION AND ENGAGEMENT

Building a robust educational community is at the apex of this study. Students were particularly impartial to classes that did not have any synchronous sessions because they seek an interpersonal connection, especially in virtual classrooms. This type of socialization supports the theory of *educating the whole student* throughout the learning process and acknowledges that a teachers' everyday work includes academic and non-academic goals by relating to student success in life, such as grit, self-control, teamwork, and empathy (Cho and Littenburg-Tobias, 2016). Reconfiguring distance learning modalities in higher education to focus on nurturing the development of the whole student and concentrate on the leveling out of opportunities for many students is essential. Success includes interactive engagement opportunities, like virtual networking experiences, which creates improved socialization skills in students so traditional-age students do not struggle with the loss of specific coming-of-age experiences that could be missed during distance learning. These experiences increase students' motivation to perform better on projects and assessments because they understand the university has a comprehensive investment in their future.

It is easy to believe the world is at the fingertips of students via the internet and their ability to research other cultures and experiences. YouTube and other online media like it, have emerged in the recent decade as a useful tool to support learning, 94% of college-age students are users of this social platform (Anderson and Smith, 2018). Therefore, virtual learning is not a foreign concept for the modern student. However, reconditioning learning application and motivation must be facilitated by the educator in addition to student requirements fulfillment in their coursework. Distance learning allows these learners to fulfill the necessity to broaden their pre-college circle of influence after instruction. According to this study, 82.4% of students feel COVID-19 has hurt their ability to socially interact on campus. Connecting students to on-campus physical and virtual social resources create the needed community students desire and will decrease resistance when engaging in virtual workspaces, changing their perspective. Virtual workspaces are forecasted to be the trend of future employment. Students will have to become accustomed to operating virtually for the ease of transition into the workforce. A study from McKinsey and Company supports working remotely, stating that more than 20% of the workforce could work remotely three to five days a week as effectively as they could if working from an office (Lund, Madgavkar, Manyika and Smit, 2020). When students learn independent problem-solving skills acquired in hybrid and HyFlex learning modalities, they will use this to garner their decision-making when completing a task in their future employment.

The world is now in its third pandemic in less than twenty years, and first-year students in the *Global Fashion Insights* course are entering into a new stage of professional development. This is the time where the initial stages of socialization in the *real-world* occur. These experiences are essential in the changing of the guards from college to work and beyond. A study on the impact of required student-faculty conferences on first-year college students found that personal relationships, high-quality interactions, and increased contact with professors were of high value and promoted growth among them (Kaufka, 2010). Many students also develop long-lasting friendships and begin to understand the world's magnitude outside of their homes. If a first-year student is in a hybrid or HyFlex modality, the likelihood of understanding and having experiences with the world outside of their own home is decreased. Therefore, in life after the pandemic, distance learning is more applicable to upper-level students. Education surrounding public hygiene is at the forefront for future success as these issues will arise again. Pivoting the student perspective to their overall mental and physical success in addition to their academic success will remain a common thread throughout all coursework regardless of the discipline. After the pandemic, many business decisions will take into consideration public hygiene. For example, public hygiene understanding is now more important in manufacturing, technology, investment, transportation, and practically all industries moving forward. These are the work environments students will be entering into after graduation.

CONCLUSIONS

Having hybrid and HyFlex learning modalities as an option benefits both the university and the student. This option will provide the flexibility needed to increase enrollment and adapt to evolving learning styles. It is especially impactful in sophomore, junior, and senior years. Students evaluated course delivery preferences, content absorption, focus, student social and mental health, and their college experience during the pandemic through this study. It is essential to highlight the virtual space as a contributing factor to student engagement and consider this option's transition in the post-pandemic classroom. When educators apply this perspective, the experience of learning and teaching is optimized. The virtual space can further develop interpersonal relationships in a way approachable to students learning in the twenty-first century. This new framework has multiple opportunities to build a more creative educator-to-student relationship. Each professor can use these options and invent new tools to explore the virtual space and encourage connection, movement, and fluidity of information. The student establishes a new type of relationship with the knowledge from their educators. The virtual class has now transformed into a more collaborative space to exchange knowledge, innovate concepts, generate ideas, and establish modern communities, in addition to the flexibility necessary to sustain an inclusive and evolving college experience. Universities must effectively investigate all teaching modalities as students continue to demand learning environments that better prepare them for their future.

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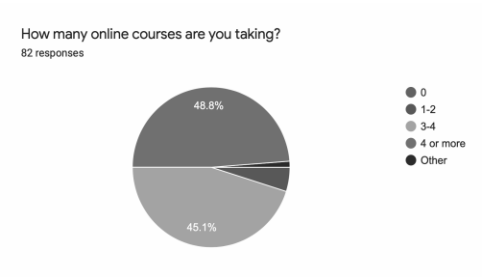
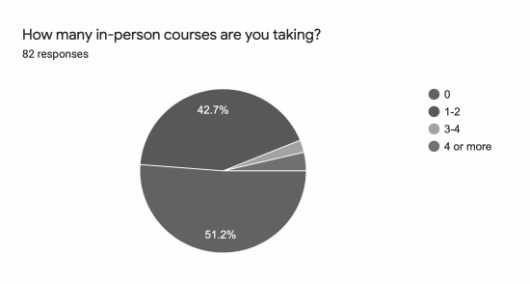
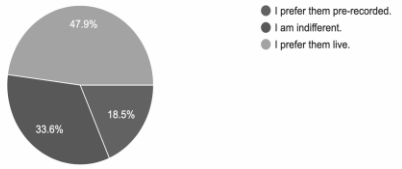
APPENDIX. CASE STUDY SURVEY RESULTS AND QUESTIONS



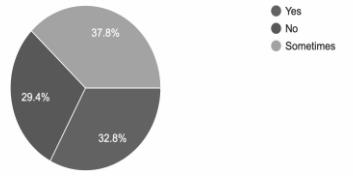


Do you prefer your online lectures prerecorded (asynchronous) or live (synchronous)?
119 responses



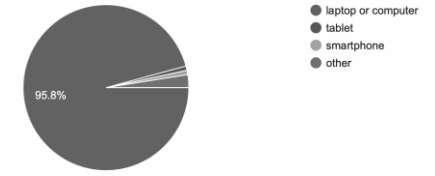
Do you feel like you are learning the same amount of imformation through your online courses as you are in your in-person courses?
119 responses

Have you had any accessibility issues? i.e. internet connectivity, laptop or device malfunctions, etc.
119 responses



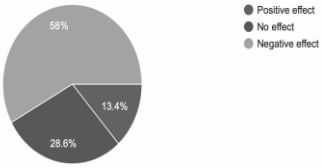
If Yes, which accessibility issue has caused the most disruption in your learning experience?
95 responses

How are you accessing remote learning?
119 responses

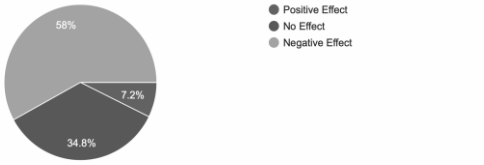


Do you feel restricted in your participation by online lectures?
119 responses

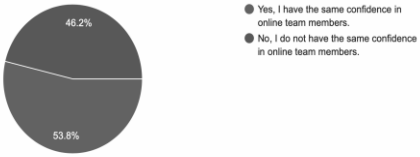
How has hybrid learning effected your ability to interact with other students for class work, group project meetings, relationship building, etc.?
119 responses



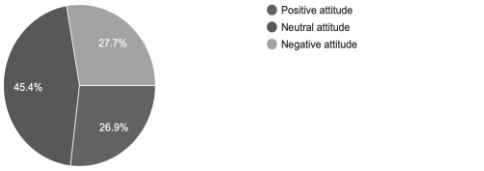
How has hybrid and/or online learning effected your ability to interact with your professor for additional support or to ask questions?
69 responses



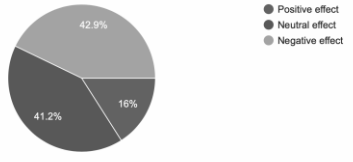
Do you have the same confidence in your remote learning teammates' ability to complete group assignments as those who meet in class?
119 responses



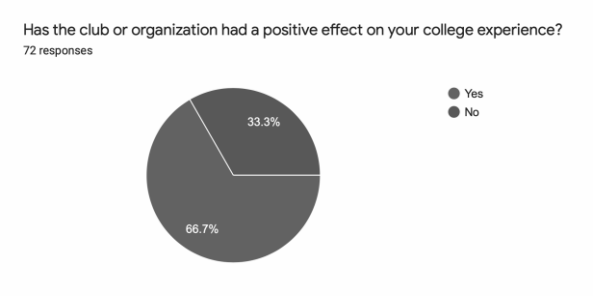
What is your overall attitude toward hybrid learning?
119 responses

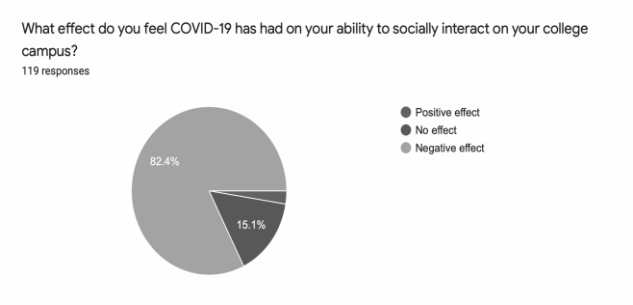


What effect has online learning had on your overall mental health?
119 responses



Have you made new friendships with classmates through hybrid learning?
119 responses





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 should be limited to 8 to 10 pages or less, although longer will be accepted if warranted.
- 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.
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- 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…

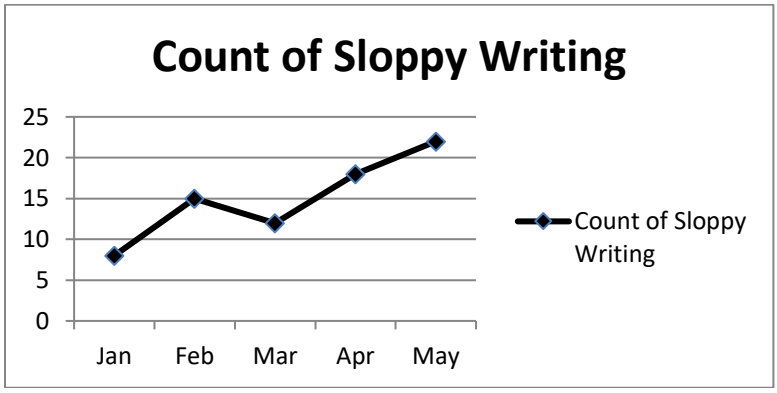
Data Collection (Sub-heading, bold but not all caps, 10 point, aligned left, bold, no line after to paragraph)
The two hundred students were asked to write 2 short papers during the semester…

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)