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# Business Education Innovation Journal

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Welcome to this issue of the *Business Education Innovation Journal*.

The purpose of this journal is to assemble researched and documented ideas that help drive successful learning and motivate business students to learn. The intention is to draw ideas from across both methods and disciplines and to create a refereed body of knowledge on innovation in business education. As a result, the primary audience includes business education faculty, curriculum directors, and practitioners who are dedicated to providing effective and exciting education.

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

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

Peter J. Billington  
*Editor*

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# Equipping Non-Analysts with Business Analytics Skills: A One-Course Curriculum for Undergraduate Business Degrees

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## ABSTRACT

The explosion of data in all industries necessitates data literacy for every business graduate, not just data specialists. However, cramming data analysis skills into a limited curriculum for non-analyst majors poses a challenge. This article proposes a solution: a single, skills-based course built around the CRISP-DM data analysis process. This course equips students with foundational data literacy. By integrating critical thinking and communication skills, the course prepares graduates to become data-savvy professionals who can make meaningful contributions in any organization. This curriculum offers a practical solution for business schools to bridge the data literacy gap and meet the growing demand for data-literate graduates.

**Keywords:** business analytics, teaching undergraduate analytics, analytics skills for business students, business degree curriculum

## INTRODUCTION

It's no secret that virtually all industries have seen a rapid increase in the amount of data that businesses produce, store, and use. The total amount of data created and consumed is projected to grow at a compound annual growth rate of 19.2% from 2020 to 2025 (Taylor, 2023) and employment of data scientists will grow 35% from 2022 to 2032, rising significantly faster than the average occupation (U.S. Bureau of Labor Statistics, 2023). However, while Data Scientists and Data Analysts are often held up as the “darlings” of the information age, the growth of data permeates the entire organizational structure, requiring data literacy for everyone (Markow et. al., 2017). Workers within departments and across the organization “must have at least foundational data literacy otherwise potential insights will go unnoticed, or even worse, misrepresentation of data will lead to poor decisions” (Markow et. al., 2017).

Data workers permeate organizations. They can be financial analysts, marketing analysts, business analysts, BI developers, administrative assistants, or any number of occupations throughout a typical business. Most of the data on designing course content for data analysis focuses on the advanced data science track and ignores the impact of data to the broader data workers and managers in an organization. This paper makes the argument that it is critical to establish the fundamentals of data analysis in a general non-technical business education program and lays out a framework for teaching those fundamentals in a single business school analytics course.

## DESIGNING THE BUSINESS ANALYTICS COURSE FOR NON-ANALYSTS

### Previous research.

Academic literature is mostly silent on the development of undergraduate business analytics courses for non-analytics business majors. However, there is some limited research, which generally discusses three different approaches.

The first approach is to add one or more business analytics courses to the business curriculum. For example, Clayton and Clopton (2019) discuss their development of three data analytics courses that were added to the required business curriculum at their AACSB-accredited private institution: Introduction to Data Analytics, Principles of Data Communication and Visualization, and Applications of Data Analytics. The addition of these courses required dropping three less business-relevant courses in the curriculum.

The second approach is to embed data analytics core competencies into existing curriculum for business school majors. Pan et. al. (2018) describe their process of incorporating data analytics learning objectives into existing curriculum with the aim that their business students would be data competent upon graduation. Taking an industry approach to developing their data analytics learning objectives, they surveyed industry professionals representing business functions including accounting, economics, entrepreneurship, finance, management, and marketing. The survey



revealed that industry professionals want business majors to be able to manage data (e.g., retrieve relevant data from systems, prepare it for analysis, match and merge, and document the data analytics process used), and use spreadsheets. Industry professionals were not as concerned with business majors having specific statistical software knowledge beyond intermediate use of Excel. Additionally, industry professionals thought descriptive statistics should be required for undergraduate business students, but not predictive or prescriptive statistics.

The third approach is to redesign existing courses to adapt to a data-driven world. For example, Hann, Rodammer, and Speier-Pero (2015) discuss the redesign of two existing undergraduate business courses at a large public university. Specifically, an undergraduate computer course was redesigned into a Problem Solving with Data Analytics course for freshman business majors, and a business information technology course was redesigned into a Business Analytics and Information Systems course for sophomore and junior business majors.

The curriculum outlined in this research offers a useful playbook to educators, whether they are creating a new business analytics course, embedding data analytics core competencies into existing ones, or redesigning courses to adapt to a data-driven world.

### **About the course designers.**

The course designers who developed the following curriculum teach at a private liberal arts college in its AACSB-accredited business school. One is an industry professional with a long-standing career in data science at a major private grocery store brand and teaches as an adjunct. The other has analyst experience for a major publicly traded hotel brand and now teaches full time. Each was tapped by the business school's dean for their industry and teaching expertise to create and teach the curriculum. The course designers were instructed to create a business analytics course in a seven- and 15-week course design that would be relevant to students graduating with degrees in marketing, business/management, and sport business management.

### **Course goals.**

Before beginning any course development, the course designers clearly identified the purpose of the course: to train business students to become data savvy business professionals. These data savvy functional area workers, sometimes called "citizen data scientists," work in almost every industry as professionals who use data analytics in their jobs but whose primary job functions lie outside of the analytics field (Education Advisory Board, 2017). For example, career entry and advancement for marketers requires proficiency in analytics (Education Advisory Board, 2017) with, undoubtedly, other functional-area entry-level positions following suit. Following the definition of "business analytics" provided by Wilder and Ozgur, this course should teach students "the application of processes and techniques that transform raw data into meaningful information to improve decision making" (Wilder and Ozgur, 2015).

Further, business students entering the job market will move toward managing others in their functional areas. Therefore, the second purpose of this course was to develop business students into future data savvy managers. These data savvy managers would have a high-level understanding of data and the methods to analyze it, so they are able to effectively perform simple data analysis and effectively communicate with and manage more technically advanced employees.

The purpose of this business analytics course is not to provide detailed technical training to students who aspire to be data analysts or data scientists. To this end, the objectives of the course are high-level, and centered around the outcomes needed by business leaders. The curriculum is built to give new employees the basic tools they need to work with data as data workers and to provide a basic understanding of data and analytics that they can use as they advance in their organizations and work with specialized analytics teams.

### **Course design.**

The course is designed to be part lecture and part hands-on lab, since there's no substitute for putting hands to keyboard and working with data. In the seven-week course design, students are given a sample data set to work with and follow throughout the course. In the 15-week course design, students are given multiple data sets to work with throughout the semester. This affords them the opportunity to practice the necessary steps of working with data interacting with different business case scenarios and business variables. Both course designs include a final project problem that puts all the knowledge gained to use and enables students to demonstrate their proficiency by working through the entire data process to answer a sample problem. Students had the option to work individually or with a partner on the course's capstone project.

### **Course learning outcomes.**

Learning objectives were drawn from the knowledge of the course designers as experienced data scientists, analysts, and functional area professionals. The main question to be answered by the course designers when determining the learning outcomes, was, “what knowledge, skills, and abilities are necessary, for business students to be successful data users, regardless of their functional area?” The course’s learning modules were designed to facilitate the following learning outcomes:

*1. Follow the process used by analysts to understand business problems and mine the data used to solve those problems.* The course utilizes the Cross-Industry Standard Planform for Data Mining (CRISP-DM) process, which was developed in 1996 by a consortium of data mining users and suppliers as a simple but robust framework for data mining (Wirth and Hipp, 2000). The CRISP-DM steps include business understanding, data understanding, data preparation, modeling, evaluation, and deployment (IBM, n.d.). As of 2022, it is still the most popular framework for executing data science projects (Saltz, 2022). The CRISP-DM process, with its six steps, is a good structure for this course. The steps of the process happen in a specific order, and following this order can be a helpful way to teach the course content. The process steps are reviewed at the beginning of each class and waypoints are established to demonstrate where the student is in the process at all times. The repetition of the process and its steps is also a useful pedagogical tool. A robust CRISP-DM guidebook with details and examples for each step, produced by IBM to be used in conjunction with its SPSS Modeler product, is distributed to students for review and as a part of the course curriculum’s artifacts (IBM, n.d.). Although the SPSS Modeler is not utilized in the course, the guide serves as an informative artifact on the CRISP-DM process.

*2. Gain an understanding of the terminology and concepts used when generating descriptive and predictive models.* This learning outcome is accomplished through numerous exercises in industry-standard Microsoft Excel using frequently used functionality such as PivotTables, SUMIF formulas, and VLOOKUPS. A brief refresh of statistical concepts helps students understand how statistical methods can be used to solve business problems using such tools as histograms, scatterplots, confidence intervals, and multiple linear regression. Some of these concepts are likely a review of a basic statistics or Excel course but putting them together in the context of solving business problems helps solidify these tools to solve practical business problems. These concepts are reinforced through homework problems using business-specific examples and data.

By practicing data analysis in a widely used program such as Excel, students increase their proficiency in the tool, an often-cited job requirement, and are introduced to the foundational concepts behind more advanced analytical tools.

*3. Write a simple query using structured query language, or SQL.* This learning outcome highlights structured query language, an essential tool used to acquire and summarize data from many different platforms. This gives students an idea of how analysts go about collecting data used for analysis and is solidified through an assignment which gives students a sample data set and asks them to develop a series of SQL statements using an open-source SQL tool such as sqlliteonline.com. For example, one prompt asks students to “Write a SQL statement that shows the total sales of each category of coffee for the first quarter of 2022.”

*4. Understand how to generate meaningful KPIs.* This learning outcome is rooted in the need for businesses to create meaningful performance measures to guide the business. This portion of the course uses articles from sources such as KD Nuggets.com and Kaushik.net to explain the value of metrics to the organization and how to create them. This module also explains the problems with poor metrics and metric surrogation, using examples such as the Wells Fargo class action lawsuit (Whitman, 2018).

*5. Design simple dashboards and reports using Excel and other business intelligence tools.* Students are exposed to tips and techniques for creating simple and useful visuals with this learning outcome, primarily through exposure to various readings about creating effective visuals. Students are asked to create some simple visualizations using PowerBI, Tableau, and/or Google Data Studio. Students are also encouraged to complete the Google Data Studio certification offered by Google as tangible evidence to employers of their dashboard skills.

*6. Consider and discuss the latest analytical technologies and how they apply in the business environment.* Throughout the course, students are exposed to examples of how data and analytics can be used successfully to drive business growth and are also briefly exposed to the concepts behind more advanced topics such as machine learning, artificial intelligence, and large language models.

## The Course Playbook

Next, we present the course playbook for this business analytics course. There are three modules covering the six CRISP-DM steps and the big ideas behind each. Each module includes an application-based test, practice problems, and business case scenarios to solve.

**Table 1: The Course Playbook: Learning Modules and Big Ideas**

<b>CRISP-DM Module</b>	<b>The Big Ideas</b>
<b>1. Business Understanding 2. Data Understanding 3. Data Preparation</b>	<ol style="list-style-type: none"><li>1. Introduction to analytics and CRISP-DM</li><li>2. The language of analytics and data</li><li>3. Data governance</li><li>4. Where data comes from, databases, and SQL</li><li>5. Data cleaning and data dictionaries</li><li>6. Exploring relationships among variables</li></ol>
<b>4. Modeling 5. Evaluation</b>	<ol style="list-style-type: none"><li>1. Describing the distribution of variables</li><li>2. Descriptive analysis using PivotTables to answer questions</li><li>3. Decision making under uncertainty – sampling, confidence intervals, and hypothesis testing in business</li><li>4. Regression analysis and forecasting</li><li>5. State of the art topics and methods: machine language, Python, artificial intelligence, and learning language models</li></ol>
<b>6. Deployment</b>	<ol style="list-style-type: none"><li>1. Communicating with data</li><li>2. Developing good measures</li><li>3. Keys to good reports</li><li>4. BI tools – introduction to Tableau, Power BI, and/or Google Data Studio</li><li>5. Final project that follows the CRISP-DM framework</li></ol>

Business students leave this course with a working knowledge of Excel and some of its more complex and useful features such as PivotTables and VLOOKUPS. They have an appreciation for the language of data and how it is acquired and validated. Further, business students have an understanding of what makes a good performance metric for the business, and they have knowledge of how to create reports using some of the most popular business tools.

The National Association of Colleges and Employers (NACE) conducts surveys each year among employers in the United States who hire graduating college seniors. In the 2024 Job Outlook survey, 95% of survey participants said that critical thinking was either a very important or extremely important career-readiness competency, but only 66% felt recent graduates were either very proficient or extremely proficient in their critical thinking skills (NACE, 2023). The report also cites technology and communications as top skills that are sought after by employers of graduating college seniors. This single course emphasizes the use of an analytics process to solve business problems (critical thinking) using Excel and other BI tools (technology) to tell meaningful stories through data (communication). Further, these are the skills that are typically screened at hiring and the necessary skills that provide a good baseline of knowledge so that the student-turned-employee can utilize data using industry standard tools and can understand the basic language of more advanced analysts.

## SUMMARY

This article presented a framework for a skills-first business analytics course designed to equip non-analytics majors with the essential abilities to use data effectively in their careers. The course leverages a proven data analysis process (CRISP-DM) and focuses on practical applications through hands-on labs and real-world scenarios. By integrating these foundational data skills into a single course, business schools can empower graduates to become data-savvy professionals who can contribute meaningfully to any organization.

The course is designed for non-analyst majors and aims to develop KSAs including:

- Data literacy through understanding data terminology, data acquisition methods, and data cleaning processes.
- Basic data analysis by performing descriptive analysis using tools like Excel pivot tables and basic SQL queries.
- Data visualization by creating clear and informative reports and dashboards with tools like Power BI, Tableau, and Google Data Studio.
- Critical thinking by applying the CRISP-DM framework to solve business problems using data.
- Communication by communicating insights from data analysis effectively.

As the volume and importance of data continues to grow, business schools have a critical role to play in ensuring all graduates are equipped with data literacy skills. This one-course curriculum offers a practical and effective solution to meet this growing demand.

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# The Effect of the COVID Disruption in 2020 on High School Learning and College Preparation: One College's Experience

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## ABSTRACT

The detrimental impact on learning from the COVID disruption in the Spring of 2020 has been well discussed. There seems to be no doubt that there is a lingering effect from that event, as colleges are now dealing with students that had a high school experience unlike their older classmates. The question of how this impacts their college preparation is not as well known or studied. This study seeks to compare quantitative objective measures of learning, aptitude, and reasoning ability over a pre- and post-COVID time period. The analysis of the data yielded mixed results. Some measures, such as SAT verbal and high school GPA are higher in the post-COVID period. The Watson Glaser test for critical thinking did not indicate that the tests scores differed between the pre- and post-COVID periods.

**Keywords:** COVID effect on learning, high school students' preparedness for college, grade inflation,

## INTRODUCTION

The COVID related events of March 2020 mark a defining period in education. The effect of the pandemic, with its associated shutdowns, quarantines, social distancing, and masking, to name a few, had a significant effect on the learning environment and learning itself. Large blocks of instructional time were lost due to school systems shutting down for extended periods of time and the lost instructional time was accompanied by lost learning. There were also impacts on the social development and maturation of students, as they went from being active and seeing friends at school on a daily basis to nearly complete isolation at home. The resumption of schools in the Fall of 2020 was also a new experience. Social distancing and distance learning became the norm.

The question of how much learning was lost and what to do in order to recover what was lost has been a topic of extraordinary interest nationwide. For instance, the Brookings Institute completed a study of elementary students (grades 3-8) and found that reading and math scores had fallen significantly. To put their findings in perspective, the detrimental effects of COVID on learning impacted test scores MORE than the devastation of Hurricane Katrina reduced test scores in New Orleans. The COVID declines were even larger in low-income school districts that have the least access to a means of recovery (Kuhfeld, 2022). A study by McKinsey and Company determined that students had fallen 5 months behind in the knowledge that they should have acquired by the end of the 2021 school year. Older students also fell behind and suffered mental health issues as well, such as depression and isolation. These mental health issues manifested in higher absenteeism for high schoolers, which further exacerbated the learning lost (Dorn, 2021). SAT and ACT pre-college tests have both fallen in the last few years. The ACT composite score is the lowest in 30 years (Aldric ACT, n.d.).

What is the effect on colleges as these students graduate from high school? Will the impact of the lost learning be felt equally across the different disciplines? While average GPAs have been increasing post -COVID, the ACT reported its lowest average score in 30 years. This follows the declining trend in ACT scores over the last six years, which began pre-COVID. Average ACT scores fell from 20.7 in 2019 to 19.8 in 2022. The year-to-year percentage changes over that period is an annual decline of nearly 0.5% from 2018 to 2019 and from 2019 to 2020. Post-COVID scores declined by 1.48% from 2020 to 2021 and 2.53% from 2021 to 2022. (See Table 1.) It is difficult to make statistical inferences based on such a small sample, but the increase in the magnitude of the percentage declines between the pre-COVID and post-COVID periods is substantial. Given the dramatic increase in the post-COVID decline in ACT scores, it is reasonable to assume that the decline is somehow associated with the COVID disruption of learning. Since grading rigor seems to vary greatly with school districts, the value of the GPA in admissions comes into question (Knox, 2023). Would not a more objective measure, like the ACT or SAT (in spite of their attendant problems) be a better indicator?

The falling ACT scores would suggest that higher education in general would need to shift resources towards more remedial courses to help these students get caught up. Or will highly selective institutions continue to select the brightest from the applicant pool, leaving other institutions to deal with a disproportionate level of remediation? How will the mental health issues be distributed? Can we assume those less impacted academically also felt less depressed and isolated?

## ONE SCHOOL'S EXPERIENCE

The United States Coast Guard Academy, one of the nation's five federal service academies (along with US Military Academy, the Naval Academy, the Air Force Academy, and the Merchant Marine Academy) is a small college (around 1000 students) with the student body hailing from nearly every state in the union and several foreign countries. Beginning with the 2020-2021 admissions cycle (students entering in the Fall 2021), an SAT or ACT score was not required as part of the admission package. This was in response to an anticipated difficulty for potential applicants in taking one of the standardized tests because of the COVID-related restrictions. In spite of the additional difficulties in taking the tests during this time, 88% of the applicants still included test scores with their application package. High scores only serve to strengthen an admissions package. High school GPA is also part of the application, but, as stated earlier, these numbers are difficult to compare across school districts. *US News and World Report's* 2024 Annual College Ranking rated the Coast Guard Academy as the top-rated institution in the "Regional colleges – North category" (Wood, 2023).

New cadets arrive on campus approximately seven weeks before classes start in August. While these new students would be referred to as "freshmen" at most other schools, here they are referred to as "swabs," or fourth class (4/c) cadets. During this summer orientation period, they are introduced to numerous aspects of military life, such as marching, wearing the uniform, military courtesies, and physical training. There is also an academic component to this preparatory period. Every major on campus has a math component, so cadets are assessed to see where they should begin their math sequence, either Pre-Calculus, Calculus I, or Calculus II. All cadets also are given the Watson-Glaser Critical Thinking Test. Until recently, all cadets also took the Watson-Glaser test again prior to graduation as an institution-wide assessment measure of development. Currently, only Management majors take the post-test prior to graduation, as those test scores are part of the Management Department's assessment for the Association to Advance Collegiate Schools of Business (AACSB) accreditation review. Other majors have opted to use other assessment methods to measure critical thinking prior to graduation.

## QUESTIONS TO EXAMINE

There are several areas to address. First, is the Coast Guard Academy's applicant pool, as measured by average SAT scores (or ACT scores), high school GPAs, their level of math preparedness, and Watson Glaser scores, the same before and after COVID? Were the measures of academic preparedness (SAT/ACT and GPA) higher in the pre-covid period? Likewise, did the objective measure of critical thinking decline as a result of their COVID experience? Did it matter where you were in high school when COVID hit? For instance, if you were in the 9<sup>th</sup> grade in 2020 (high school class of 2023), were you better able to "make up" the lost learning than someone who started college in the Fall of 2021 or 2022, since you had more time to make up the lost ground? The high school class of 2020 probably did not have a prom, but their high school learning was least impacted by COVID. Many had taken the SATs earlier in the school year to submit with their college applications. With 7.5 semesters completed before COVID hit, it is reasonable to assume that their learning was affected less than their younger high school classmates.

There is also a great deal of variability in how school systems implemented their "return to the classroom" in the Fall of 2020. The Center for Disease Control (CDC) was suggesting social distancing of six feet or more. This meant that classroom capacity in the Fall of 2020 was much less than before under these new guidelines. School systems often divided their student body into two groups to make them more manageable. One option was to teach half of the students in the morning and half in the afternoon. This provided all content in an "in class" environment, but for less time than before. Other systems opted for half of the students in-person and the other half on-line and remote, with the groups rotating between being in class or online. While this meant the length of the school day was not shortened, half of the content time was remote. The effectiveness of the online instruction depended on several variables. One key variable was how quickly the teacher became proficient in online instruction. The students also needed to adapt to this new way of instruction. Being at home in front of a screen comes with a host of distractions that are not present in the actual classroom. Connectivity was also an issue. Even if the students were provided with the necessary computer hardware, such as a laptop computer, their internet connection varied greatly. Some began to rely on their

cell phones or public wi-fi for class and homework, as this was a better option than their internet connection at home (Anderson, Faverio, and McClain, 2022).

## DATA

This study looked at the admissions data and internal test scores for the cadets who entered the Academy from 2012 through 2022. The cadets arrive early July for a seven-week indoctrination into military life. This is usually about 275 young men and women. Some will withdraw and leave the Academy before classes begin in mid-August. This study only includes those cadets that remained and finished their fourth class year (freshman year). Our sample size was 2302 cadets over the eleven years. The pre-COVID years of 2012-2019 numbered 1690 cadets while the post-COVID data set (2020-2022) was 612 cadets.

The average SAT scores (both math and verbal), high school GPA, the local math placement test, and the Watson Glaser test scores, for each year during the sample period (2012-2022). The GPA for the cadets at the conclusion of their 4/c year (first year) was also collected. The sample period was divided into two groups, pre-COVID and post-COVID. Since those cadets arriving in the Fall of 2020 had taken their SAT exams prior to the beginning of the pandemic in March of 2020, the class that arrived on campus Fall 2020 was included in the pre-COVID period. Their high school GPA from 2020 was also included in the pre-COVID period. Since The overwhelming majority of their high school work was completed prior to the pandemic, this seemed most reasonable. It also provides for data consistency in the statistical analysis.

A two-tailed difference in means test was performed on these averages. Beginning with cadets arriving Fall 2021, neither SAT nor ACT scores were a required element for admission at the Coast Guard Academy. However, an overwhelming majority of applicants (88%) did include those scores. Figures 1 and 2 show the average Math and Verbal SAT scores of newly enrolled cadets versus the national average. Both sets of data show considerable variability over the studied period. Table 1 shows the average scores from 2012 through 2022. These admission data, 4/c grade point averages, the math placement test scores, and the Watson Glaser test scores are maintained in various offices across campus, such as the Admissions Office, the Registrar, and the Office of Institutional Research. (The Watson Glaser scores for 2016 could not be found.)

The data on the national averages were from several sources. A study by American College Testing (the organization that delivers the pre-college ACT test) published the average grades for the four academic disciplines in high school: English; Math; Social Studies; and Science. An average was taken of these numbers to determine the average high school GPA (Evidence..., 2023). SAT average scores from 1952 through 2023 were also found on the web (Aldric SAT, n.d.), as were the composite ACT scores (Aldric ACT, n.d.). These average figures are shown in Table 1.

## RESULTS

The results of the statistical tests provided an interesting array of results for the Coast Guard Academy. It was found that the mean SAT Verbal score was higher during the post-COVID period and the difference was significant at the 5% level. There is an observed difference in the mean SAT Math Scores, however, this difference is not quite significant with a p-value of 0.067, slightly greater than our 0.05 cut-off. Math SAT scores showed a declining trend in the post-COVID period. The median math SAT scores for enrolling cadets was 680 in 2020 (last pre-COVID year) and 660, and 650 for the classes entering in 2021 and 2022, respectively. The year-to-year declines in the mean SAT math scores in the post-COVID years from were significant at the 5% level. The CGA math placement scores were lower in the post-COVID period, which mirrors the decline in the math SAT. The Watson Glaser test scores did not show a significant difference between the pre- and post-COVID periods. These results are in Table 2.

Finally, the GPAs of the cadets their 4/c year (first year) were higher in the post-COVID period than before the pandemic disruption (see Table 2). Since SAT verbal scores increased while math scores declined for that period, it is difficult to conclude the higher first-year GPAs were the result of more prepared students. A more likely explanation is that this result mirrors the grade inflation that has been documented at the high school and collegiate level in recent years. See Hess 2023, and Nam 2024 for descriptions of this widespread trend.

## CONCLUSIONS

The mixed nature of these results makes inferring any conclusion circumspect at best. For instance, if COVID was such a disruption, why did the SAT Verbal scores increase at the 5% level while the math scores did not? Are language arts skills more adaptable to the new methods of instruction the pandemic required schools to implement? High school GPAs were higher in the post-COVID era, but this seems to be more of a continuation of a trend that started earlier than the result of the pandemic. Finally, if these students were less prepared for college than their predecessors, why did the local 4/c (first year) GPAs increase in the aftermath of COVID?

## IMPLICATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

It is widely accepted that COVID has a significant detrimental effect on high school learning and the college preparation of those students. This analysis does not fully bear out this commonly accepted assumption. Admittedly, this study uses a sample that is somewhat unique, students from a single institution. The Coast Guard Academy also has the advantage of the internal math placement test to provide an unbiased assessment of the quantitative preparedness of the new cadets.

Many schools have been quick to accept the general notion that new college students are significantly less prepared than their predecessors. To counter that shortcoming, more institutions are offering more remedial courses and additional academic support services. This study does not support these responses. What it does support is the need for institutions to ascertain the level of preparedness of their incoming students. After a number of years where SAT test scores were not required in lieu of a more holistic and qualitative admissions process, many schools have now reversed course and are requiring SATs as part of the admissions package. The high school grade inflation that has occurred over the recent past makes GPAs less indicative of future academic success.

The results of this analysis suffer from “survivor bias” in our data set. The sample only includes cadets that applied with an SAT score, were accepted, matriculated, and completed their first year. Survivor bias is a shortcoming common to many studies that attempt to measure the effect of an event on a particular outcome. To be included in the study, a data point must exist at every step of the process. However, this limitation does not diminish the results that were obtained for the data set as constructed.

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Table 1												
	National averages					Coast Guard Academy Averages <sup>4</sup>					CGA Local Tests	
HS Grad	Math	Verbal	ACT		HS	Math	Verbal	HS	1st-yr	Math	Watson	
Year	SAT <sup>1</sup>	SAT <sup>1</sup>	Composite <sup>2</sup>	% Δ	GPA <sup>3</sup>	SAT	SAT	GPA	GPA	Placement <sup>4</sup>	Glaser <sup>4</sup>	
Pre-COVID	2012	514	496	21.1		3.30	647	604	3.74	2.902	66.57	55.06
	2013	514	496	20.9	-0.96%	3.30	657	620	3.70	2.912	70.38	55.87
	2014	513	497	21	0.48%	3.31	642	619	3.77	2.751	65.8	49.99
	2015	511	495	21	0.00%	3.32	649	613	3.78	2.857	68.07	53.01
	2016	508	594	20.8	-0.96%	3.30	646	613	3.79	2.905	67.56	NA
	2017	527	533	21	0.95%	3.33	617	594	3.92	2.930	64.42	55.17
	2018	531	536	20.8	-0.96%	3.35	662	642	3.87	3.117	66.12	54.33
	2019	528	531	20.7	-0.48%	3.39	668	649	3.81	3.284	66.19	53.77
	2020	523	528	20.6	-0.49%	3.43	678	660	3.75	3.144	71.84	55.75
Post-COVID	2021	528	533	20.3	-1.48%	3.46	659	649	3.73	3.068	64.62	53.89
	2022	521	529	19.8	-2.53%	3.44	644	639	3.75	3.102	61.54	53.01
Sources												
1 <a href="https://blog.prepscholar.com/average-sat-scores-over-time">https://blog.prepscholar.com/average-sat-scores-over-time</a>												
2 <a href="https://blog.prepscholar.com/average-act-score-by-year">https://blog.prepscholar.com/average-act-score-by-year</a>												
3 Average HS GPA is the average of the grades in English, Math, Science, and Social Studies Studies found in Sanchez (n.d.) <a href="https://www.act.org/content/dam/act/secured/documents/Evidence-of-Grade-Inflation-in-English-Math-Social-Studies-and-Science.pdf">https://www.act.org/content/dam/act/secured/documents/Evidence-of-Grade-Inflation-in-English-Math-Social-Studies-and-Science.pdf</a>												
4 Coast Guard Academy data are from records maintained by the Registrar, Admissions, and the Office of Institutional Research												

Table 2		Pre-COVID minus Post-COVID results			
		Variable	Difference	t-statistic	p-value
		SAT Math	6.449	1.828	0.0676
		SAT Verbal*	-14.2	-3.908	9.58E-05
		HS GPA	-0.038	-0.242	8.09E-01
		Math Placement*	3.977	3.789	0.00016
		Watson Glaser	0.7	1.334	0.1825
		1st-yr GPA*	-0.099	-3.157	1.60E-03
		* Significant at 5%			

Figure 1

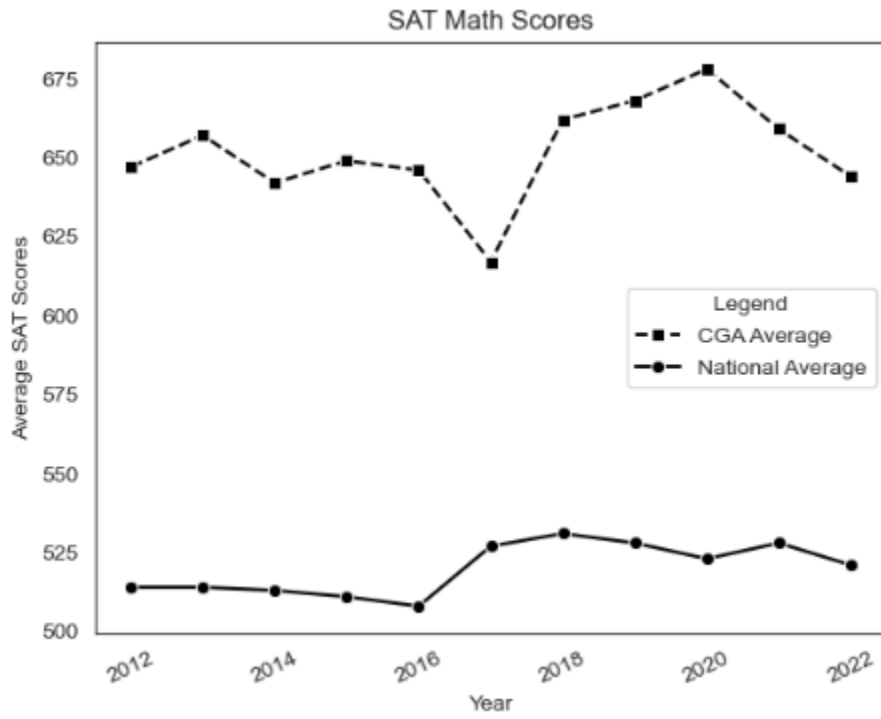
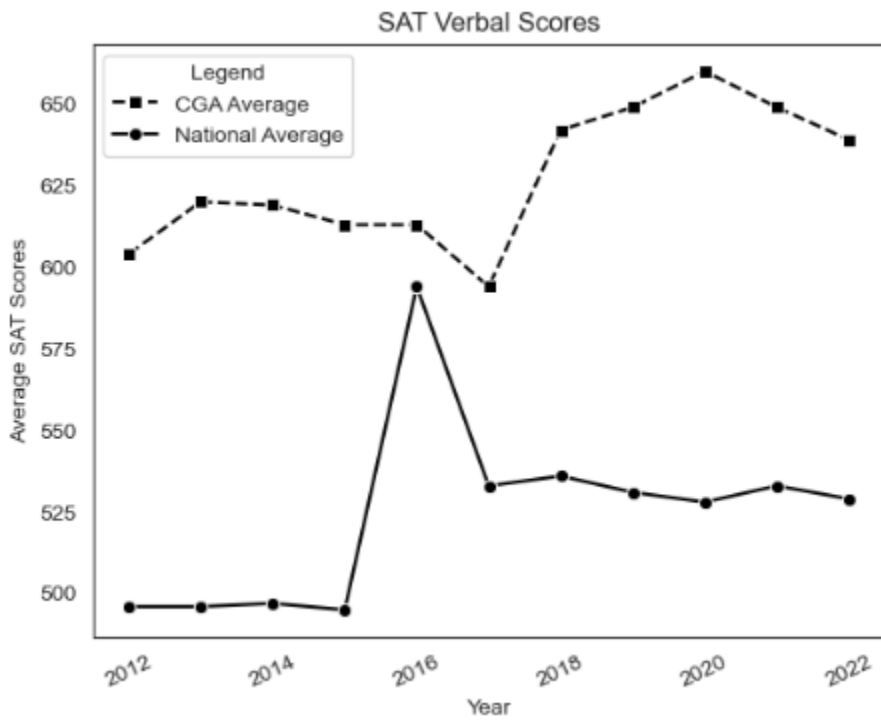


Figure 2



# The Role of Faculty in Facilitating Trust Building in Student Groups: Review and Recommendations

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## ABSTRACT

Faculty have always been concerned with student performance and satisfaction with coursework and learning applications. Group projects provide an opportunity for student involvement in applying and investigating course concepts. Research has identified several intra-group processes that have a major impact on the effectiveness of both face-to-face (FTF) class meetings and online class interactions as they enhance desired outcomes. Our goal for this paper is to review the intra-group processes and provide a set of recommendations to aid faculty in enhancing group project experiences, thereby increasing student performance and satisfaction. Findings indicate that intra-group trust is the most critical of these processes. Studies suggest that effective group communication provides an environment within which trust exists and with which it interacts to increase the impact on performance. Two other group processes that improve trust are peer learning and intra-group conflict management. We combine several findings to offer recommendations to faculty to help increase student satisfaction with team members, performance grades and the course itself. For example, we recommend faculty meet with groups very early in the semester and provide task-related feedback throughout the course. We also suggest initial interactions be more social in nature, evolving into more task-related interaction to help create both affective and cognitive trust.

**Keywords:** Swift trust, Team performance, Intra-group trust, Student satisfaction, Recommendations for faculty

## INTRODUCTION

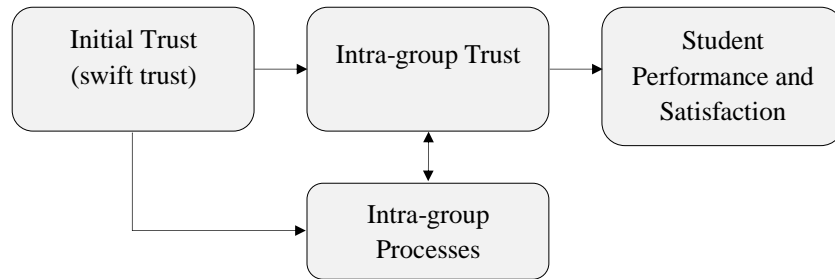
Group projects provide an opportunity for student involvement in applying and investigating course concepts. Their use is increasing dramatically, particularly after the pandemic required new ways to conduct class interactions. Faculty have always been concerned with student performance and satisfaction with coursework and learning opportunities. They spend considerable time creating course activities and materials to continually improve their offerings and adjust course syllabi. Research has identified several intra-group processes that have a major impact on the effectiveness of both face-to-face (FTF) class meetings and online class interactions as they enhance desired outcomes. Our goal for this paper is to provide a set of recommendations to support faculty in enhancing group project experiences, thereby increasing student performance and satisfaction. Research has found three types of satisfaction are important to students as they evaluate group projects: satisfaction with group members, satisfaction with group performance/grades and satisfaction with the overall course as measured by end-of-course student evaluations (see, e.g., Choi, Zeff, & Higby, 2022; Elliot & Shin, 2002; Yusoff, McLeay, & Woodruffe-Burton, 2015). This goal, and the impetus for this paper, comes directly from previous research (see, e.g., Choi et al., 2022; Hill & Epps, 2010; Rahman, Ramakrishnan, & Ngamassi, 2020; Yang, Becerik-Gerber, & Mino, 2013).

Our literature review provides many research articles investigating the impact of various intra-group processes and their impact on student outputs. The single most important intra-group process found in this literature is trust (De Jong, Dirks, & Gillespie, 2016; Ennen, Stark, & Lassiter, 2015; Romero, 2015). Students who trust their group members will be less worried about having to monitor others' behaviors and be more focused on learning the content and successfully completing course activities, enabling deeper processing of course material (Ennen et al., 2015). Other intra-group processes we include here, as they impact intra-group trust, are communication, conflict management and peer learning. We concentrate on suggestions to faculty that attempt to directly increase the levels of these processes, since they have the best opportunity to increase student satisfaction and performance (e.g., trust – Ennen et al., 2015; communication – Sarker, Ahuja, Sarker & Kirkeby, 2011; conflict management – Roberson, Fish, Olmstead, & Fincham, 2015; peer learning – Mustafa, 2017).

Swift trust is first introduced as a concept found in temporary teams to suggest trust need not occur only after long periods of interaction and experience with other people (Meyerson, Weick, and Kramer, 1996). The initial level of swift trust also has an impact on intra-group processes (see, e.g., Kroeger, Racko, & Burchell, 2021; Robert, Denis, & Hung, 2009) and, as a result, the long-term level of trust. Hence, swift trust is a necessary ingredient in the initial

functioning of a group and its ability to grow and develop into a high-performing team, which has a major impact on overall performance and satisfaction. Both types of trust (cognitive and affective) are important in determining the level of student and group efficacy (Stubbendorff & Overstreet, 2019). These conclusions suggest a research model for this paper as seen below (See Figure 1).

**Figure 1: Research Model for This Paper**



## LITERATURE REVIEW

Research results, as reflected in Figure 1, above, indicate that intra-group trust is the single most impactful process on satisfaction and performance found in our literature review, while the intra-group processes of communication, peer learning and conflict management interact with intra-group trust to further enhance performance and satisfaction (see, for example: Blomqvist & Cook, 2018; Choi et al., 2022; Crisp & Jarvenpaa, 2013; De Jong et al., 2016; Ennen et al., 2015; Hansen, Morrow Jr., & Batista, 2002; Morris, Marshall, & Rainer Jr., 2002; Romero, 2015; Stubbendorff & Overstreet, 2019).

### Initial/swift trust

Swift trust is developed before any interaction takes place within temporary systems:

. . . the trust that unfolds in temporary systems is more accurately portrayed as a unique form of collective perception and relating that is capable of managing issues of vulnerability, uncertainty, risk, and expectations. These four issues become relevant immediately, as soon as the temporary system begins to form. We argue that all four issues can be managed by variations in trusting behavior, and if they are not managed, participants act more like a permanent crowd than a temporary system. It is the configuration of these variations in behavior that accounts for the unique form that trust assumes in temporary systems, a form that we call *swift trust* (Meyerson et al., 1996, p.167) [italics in the original].

As groups are often formed very quickly, trust also forms rapidly (Meyerson et al., 1996), and this specific form of trust, swift trust, becomes critical in helping to determine the performance level of the group (Mayer, Davis, & Schoorman, 1995). Swift trust is based on assessments that are made quickly and without prior interaction (Foddy, Platow, & Yamagishi, 2009; Meyerson et al., 1996). Especially in organizational contexts such as temporary work groups and virtual teams, researchers have pointed to the pronounced importance of swift trust for collaboration success (Crisp & Jarvenpaa, 2013). In her study on student virtual teams, Chang (2009) discovers that initial levels of trust (i.e., swift trust) at the group's inception have a great effect on the group's future trusting behaviors. Kapur, Voiklis and Kinzer (2008) suggest that small initial changes often lead to vastly different outcomes over time. Coppola, Hiltz, and Rotter (2004) also note that establishing trust at the beginning of online courses has a strong relationship to subsequent course success.

Kroeger et al. (2021) note while swift trust must be "imported" (Meyerson et al., 1996), without relying too much on interpersonal interaction, conclude that swift trust is a form that is all about actions toward project completion. Swift trust of other team members is based on one's perceptions and expectations (Foddy et al., 2009), and is derived from one's instincts, intuitions or feelings concerning whether an individual, group or organization is trustworthy (Morrow, Hansen, & Pearson, 2004). This initial trust is critical in determining how well intra-group processes function within the team (Sarker et al., 2011). This type of trust also impacts the perceptions of future interactions with other members, helping to determine the effectiveness of other intra-group processes (Kotlarsky & Oshri, 2005). It also both directly

and indirectly has an effect on intra-group or long-term trust (Zolin, Hinds, Fruchter, & Levitt, 2004; Robert et al., 2009). “It is more a cognitive and depersonalized action form of trust than interpersonal, and there is less emphasis on feeling, commitment, and exchange” (Meyerson et al, 1996, p. 191). Any opportunities available to faculty members for increasing this initial level of trust, therefore, can have a major impact on the group’s interactions and a correspondingly large impact on group members’ outcomes (Blomqvist & Cook, 2018).

Iacono and Weisband (1997, January) find that continuous interaction was important in increasing the level of trust throughout the project. Initial swift trust is very fragile in virtual teams, although constant communication regarding project content helps in maintaining this type of trust (Jarvenpaa, Knoll, & Leidner, 1998). Jarvenpaa and Leidner (1999) find that while task-related communication was necessary for maintaining trust, social communication complementing task communication may strengthen trust. They also find that high trust teams exhibit swift trust from the outset. Kotlarsky and Oshri (2005) even suggest creating social space between team members and introducing a variety of communication tools as well as clear communication procedures. Robert et al. (2009) find that category-based processing of team member characteristics dominated the initial formation of swift trust. However, once individuals obtain sufficient information on their own to assess a team member’s trustworthiness, the effects of swift trust decline and trust based on knowledge of their team members’ behaviors becomes more important.

Crisp and Jarvenpaa (2013) show that swift trusting beliefs have direct and mediated effects on permanent intra-group trust. They note that the intra-group process of normative actions helps to increase the impact of a more permanent form of trust to enhance the group’s performance. High swift trusting beliefs give team members the necessary confidence to engage in normative actions, which become a sustainable basis of more permanent trust and performance. Essentially, they apply the same research model as we presented in Figure 1, above.

Sarker et al. (2011) find that communication and trust interact to impact performance. And as Blomqvist and Cook (2018) suggest, with the dramatic increased impact of technological advances, including AI, the ability of creating trust more quickly will become a critical skill in all forms of group formation. They indicate how the concept of “swift trust” allows us to understand the beginnings of group trust and that we must learn to apply it in ways that better conform to the new possibilities of future group memberships.

A direct application of this view is seen in Stubbendorff and Overstreet (2019) and found in their strategy of trust building in flight squadrons in the United States Air Force.

With the current environment in the USAF ... swift trust may provide an excellent starting point from which to build genuine trust. Deployed commanders must build trust within their units even more quickly than a commander in a traditional unit ... with a mix of personnel from different units around the world ... unit members typically show up prepared for combat on Day 1 and have little to no time to acclimate to their new unit and members of their unit. There is very little time to get to know each other ... By building upon swift trust, commanders may focus on actions and tasks that can develop relationships and build genuine trust more quickly. Providing commanders with a clear pathway to building trust may create an avenue for increased operational performance as well as increased employee organizational commitment and job satisfaction (Stubbendorff & Overstreet, 2019, pp. 16-17).

### **Intra-group Trust**

Trust is defined as faith in others’ behavior and goodwill that can grow or vanish due to interaction and experiences (Coleman, 1990; Hakanen & Soudunsaari, 2012; Ring & van de Ven, 1992; Schilke, Reimann, & Cook, 2021). Several papers present multiple elements of trust (see, e.g., Zenger and Folkman, 2019; Vodicka, 2006). For our purposes, we use McAllister’s (1995) discussion of two different dimensions of trust, namely, perceptions of intentions (or affective trust) and ability (or cognitive trust) of others. As Erdem and Ozen (2003) find, cognitive and affective trust each lead to higher performance. Likewise, Hansen et al. (2002) find that both ability (cognitive trust) and benevolence (affective trust) are critical in leading to higher task completion (satisfaction/performance).

Turesky, Smith, and Turesky (2020) interviewed several managers to identify ways of increasing trust in the workplace and find strong support for the view that trust is more easily and fully developed in FTF interactions (when co-location exists among group members) and creativity is needed to establish trust when interacting virtually. Likewise, Hakanen and Soudunsaari (2012) find that trust building is a slow process, but it can be accelerated with open interaction and good communication skills. They suggest that enhancing affective trust requires personal knowledge and regular face-

to-face interaction (Hakanen & Soudunsaari, 2012). Patel et al. (2021) explore the extent to which team members develop a sense of shared identity and team cohesion and identify factors facilitating perceived team cohesion, such as a weekly case conference call, a sense of transparency in discussing challenges, engagement in team tasks, and support from the leadership. Stubbendorff and Overstreet (2019) emphasize that building trust requires meeting FTF regularly and consistently. Moreover, every interaction within a team provides an opportunity to increase cognitive trust with feedback (Stubbendorff & Overstreet, 2019). Thus, swift trust is cognitive-based with decreasing impact once interaction takes place, while knowledge-based trust is a more permanent, intra-group trust and is affective-based (Robert et al., 2009). Cognitive trust is critical since performance will not be as high without it, yet team performance cannot reach its potential if affective trust does not exist (Moldjord & Iversen, 2015). Hence, while cognitive trust is important, without affective trust team performance is limited (Dirks & Ferrin, 2002; Schaubroeck, Lam & Peng, 2011).

Trust in a team context is the belief that team members have good intentions as well as having confidence in the capability and character of team members (Cook & Wall, 1980; Dirks, 1999; Langfred, 2004; Zand, 1972). Trust in peers provides a main source upon which teammates feel free to share information, explore, and contribute their ideas (Barczak, Lassk, & Mulki, 2010) and the importance of trust in school situations has been well established (Romero, 2015). Teamwork offers more information sharing and cooperation, which in turn leads to higher team creativity and performance (Larson & LaFasto, 1989). Whitener, Brodt, Korsgaard, and Werner (1998) suggest that teams need more trust as compared with individuals because their tasks require a high degree of interdependence. Ennen et al. (2015) find that if a team wants to achieve its objectives, it needs high levels of trust.

### **Interactions between Intra-group Trust and Other Group Processes**

Team communication is an essential factor for team development or interdependent team activities that lead to consequences such as high task performance (Marks, Mathieu, & Zaccaro, 2001). Communication is an important element for effective teamwork (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). Participants must share information to learn about other members' capabilities and intentions, and they must be involved in communication to develop a strategic plan for their work. Barry and Stewart (1997) indicate that exchanging and effectively gathering information is necessary for team performance. Furthermore, Boies, Fiset, and Gill (2015) find that there is a positive relationship between team communication and team trust. Akhtar, Khan, Hassan, Irfan, and Atlas (2019) also note that trust increases and supports communication, while communication enhances trust.

Other ways to increase both affective and cognitive trust include having/developing a shared vision, clear roles and responsibilities, willingness for cooperation, and supporting and encouraging leadership (Hakanen & Soudunsaari, 2012). They suggest that with trust, people are more willing to share ideas and information, and find sharing critical information and having a high level of communication through constant interaction lead to higher performance (Hakanen & Soudunsaari, 2012). To build on swift trust, group members must both introduce conversation and promptly respond to others' communications to display that they are committed to the group's goals (Germain & McGuire, 2014).

One of the more effective sources of group member learning is internal, that is, information coming from other group members (Mustafa, 2017). Peer learning has been shown to enhance student learning and levels of self-efficacy (Brannagan, Dellinger, Thomas, Mitchell, Lewis-Trabeaux, & Dupre, 2013). An environment of greater trust encourages peer learning and improves shared learning opportunities (Ngo, Stanescu, Swenson, Moore, Sze, & Iyer, 2019). The less threatening a learning environment is, the more trust can be built (Huijser, Kimmins, & Evans, 2008). Ladyshevsky and Gardner (2008) indicate that discussion and deeper learning outcomes occur when communications are between peers. Students noted that the utility of peer assisted learning, particularly in relation to peer-based feedback, was possible only with higher levels of student trust towards the end of the year (Tai, Canny, Haines, & Molloy, 2017). Butler and Hodge (2001) find that allowing students to work as partners while conducting peer assessment tasks opens the doors of opportunity for developing cooperation, positive interactions, and trust among peers. A participant in the study by Navalkha, Levitt, Johnson, and Farrell (2021) states "growing trust breeds meaningful sharing of visions, resources, tools, and vocabularies and fosters a tangible sense of mutual support needed to meet big challenges." These authors note how the conclusion of this exchange reflects how the members develop a lasting trust, which increases team performance. Thus, a reciprocal relationship occurs between intra-group trust and in-group peer learning.

A similar reciprocal relationship seems to occur between intra-group trust and conflict management (Getha-Taylor, Grayer, Kempf, & O'Leary, 2019). Successful conflict management or fast intervention when conflict starts will lead to higher team trust (O'Leary, Amsler, & Kopell, 2005; Turesky et al., 2020), and leads to more effective conflict resolution (Getha-Taylor et al., 2019). Simons and Peterson (2000) demonstrate that when intra-team trust is low, there is a greater likelihood that high levels of task conflict will escalate into relationship conflict, as opposed to when there is a high level of trust within the team. Peterson and Behfar (2003) corroborate these findings, affirming that trust acts as a deterrent, preventing task conflict from evolving into relationship conflict. Therefore, trust has a beneficial impact on team effectiveness by reducing the incidence of relationship conflict (Dirks & Ferrin, 2002; Peterson & Behfar, 2003; Simons & Peterson, 2000).

### **The Impact of Trust on Performance**

Team trust is understood as a collective mindset within a team, where members are willing to expose themselves to vulnerability because they have optimistic beliefs about the intentions or behavior of other team members (Fulmer & Gelfand, 2012: 1174). Trust among team members is a vital element for effective team performance (Boies et al., 2015; Crisp & Jarvenpaa, 2013) and such trust forms the basis for open knowledge sharing, exploration, and members giving their best, especially in collaborative settings aimed at creative results (Barczak et al., 2010). Based on the organizational trust model by Mayer and colleagues (1995), trust within a dependent relationship promotes outcomes via actions that involve taking risks. Essentially, when one party trusts, they perceive the other party's kindness, competence, and honesty. As a result, they are more inclined to display cooperative actions, like assigning crucial tasks or backing change processes, with the trusted party. Such collaborative behaviors can be pivotal for teams in achieving their objectives. Teams that effectively build trust within their group encourage collaboration, making it easier for members to fulfill team-centric tasks.

Comprehensive reviews indicate a positive correlation between trust within a team and its task performance (Blomqvist & Cook, 2018; Colquitt, Scott, & LePine, 2007; De Jong et al., 2016; Morrissette & Kisamore, 2020). Further, an association between trust and creativity in teams is found in experimental studies (Barczak et al., 2010; Klimoski and Karol, 1976) while Prati, Douglas, Ferris, Ammeter, and Buckley (2003) indicate how trust enhances group performance.

Trust leads to more member satisfaction by facilitating cooperation and mutual respect among team members (Jarvenpaa, Shaw, & Staples, 2004). This occurs because trust decreases the fear that someone might take advantage of you while also promoting feelings of safety and benevolence (Robert et al., 2009).

### **CONCLUSIONS AND RECOMMENDATIONS**

The literature review strongly suggests that trust is a critical variable in increasing both team performance and satisfaction. Initial, or swift, trust is a form of cognitive trust, which must be maintained for a group to function effectively. More importantly, swift trust allows the team to begin working toward a collective project completion. It is a very fragile form of trust, however, and must be further developed into a more permanent form of trust. Its impact is most positive when cognitive-based trust strengthens while affective-based trust evolves from swift trust, allowing a team to move toward improving performance levels and, ultimately, reaching its potential in both project performance and member satisfaction. As Crisp and Jarvenpaa (2013) find, swift trust has no direct impact on team performance. In fact, the only variable that directly (and positively) significantly influences team performance is later trust, or what we call intra-group trust. The very first actual interaction creates the emergence of a more permanent affective-based intra-group trust and reduces the reliance on the initial swift trust. In addition, other group processes have been found to enhance the level of intra-group trust. For example, we included information on how team communication has a reciprocal relationship with trust. Research found as trust becomes more permanent, moving away from fragile swift trust, communication is improved while trust continues to evolve. Conflict management and peer learning are also greatly improved by high intra-group trust just as trust is strengthened by effective conflict resolution and increased peer learning. It is toward these ends that we provide recommendations for faculty to reap the benefits of high team trust based on cognitive and affective trust.

### **Communication, Early and Often**

The literature is clear regarding the importance of creating communication opportunities as quickly as possible. One way to provide an example for students of interaction within their teams is for a faculty member to meet with each group and act as a role model, preferably during the initial class meeting. This can be accomplished in both in-person classes and virtual class sessions. As part of this first session, ice-breaking exercises provide an opportunity for team

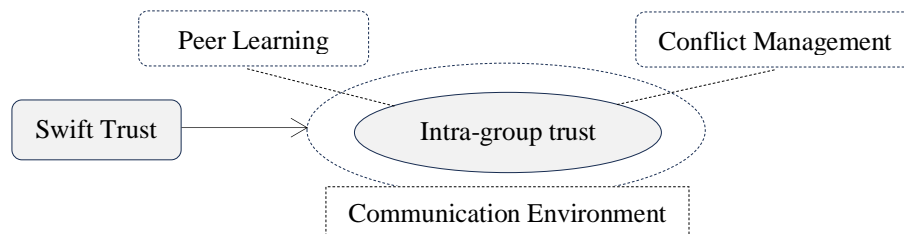
members to interact more socially, which has been found to allow team members to develop the beginnings of affect-based intra-group trust and quickly reduce the role that the more fragile cognitive-based swift trust will have on team interactions and evolution. By moving the teams to rely on a more permanent form of trust, the potential for positive team performance is enhanced. There are many ice-breaking exercises available. An example of such an exercise is the use of a classic skit by comedians Bud Abbott and Lou Costello. This is a witty and relevant resource for students to: understand and utilize communication principles, identify obstacles in communication, and learn strategies to overcome them (Julien, Clayton, & Stratton, 2021). The key here is to have students interact on a social level to provide an opportunity for gaining affective data which helps transform swift trust into a more permanent intra-group trust.

Insuring this more permanent form of trust continues to develop, we further recommend that faculty provide communication opportunities by meeting with each project team three to five times during the semester (personal communication with audience respondents at the 34th International Academy of Business Disciplines conference, March 31, 2023). As Stubbendorff (a US Air Force Lieutenant Colonel) and Overstreet (2019) find, more frequent interaction provides opportunities not only to meet with each team, the officers (faculty members) can also provide feedback to pilots (students). This strengthens both affective and cognitive trusts, allowing potentially high team performance to more fully develop. Coppola et al. (2004) suggest that trust can be strengthened in online classes by following these four strategies to establishing a group/team culture in virtual teams:

- 1) Establish early communication. Team members need to perceive the instructor’s presence as soon as they enter the course.
- 2) Develop a positive social atmosphere. Team members respond to perceived caring in instructional context. Instructors need to model solidarity, congeniality, and affiliation.
- 3) Reinforce predictable patterns in communication and action. Students need carefully structured activities and regular responses and feedback.
- 4) Involve team members in tasks. To sustain early trust formation, group members need to be involved in meaningful tasks. Instructors need to motivate, encourage, and require participation. (p. 103)

Further maintaining and developing intra-group trust, Jarvenpaa and Leidner (1999) recommend that communication be more predictable and consistent. Student teams that know when and how often a faculty member will be meeting with their team, and that all team members will get the same information from the faculty member, will be more confident that they have received the correct communication. This reinforces the data collected from personal interactions and more fully develops a permanent intra-group trust. Hence, the likelihood of higher team performance and satisfaction is increased. Turesky et al. (2020) indicate four areas in which communication aids the establishment of a strong intra-group trust: be transparent in information sharing; communicate excessively for clarity; be consistent in communication and communication channels; and, address conflict immediately. Figure 2, below, shows how swift trust can evolve into a more permanent and effective intra-group trust.

**Figure 2: Evolution of Swift Trust into Intra-group Trust**



Crisp and Jarvenpaa (2013) show that later trust beliefs have a positive impact on team performance, while early trust beliefs do not have a direct impact. So, it is important for faculty members to encourage their students to develop initial team trust as soon as they form a group. The very first actual interaction creates the emergence of a more permanent affective-based intra-group trust and reduces the reliance on the initial swift trust.

**Content of Additional Meetings by Faculty**

Two other group processes suggest specific content for mid-semester team meetings with their faculty member. Peer learning is a natural and positive outcome of using group projects in classes, both in-person and online. Fowler,



Alford, Collier, Sheffield, & Su (2019, June) find several faculty interventions that help students in term project performance. One of the highest rated strategies is progress meetings with the faculty member. These meetings take place during the semester and provide opportunities to give feedback to each student. This is consistent with the meta-analysis studies we found using empirical data (Blomqvist & Cook, 2018; Colquitt et al., 2007; Coppola et al., 2004; De Jong et al., 2016; Morrisette & Kisamore, 2020). For example, Stubbendorf and Overstreet (2019) use empirical data and note how team performance is enhanced. These meetings provide opportunities for peer learning and mentoring to take place, both of which strengthen the development of intra-group trust and increase its impact on team performance. Midterm performance evaluations also improve overall student performance by maintaining focus and participation in the term project and course material, while also reducing the end-of-semester workload for faculty. Moreover, midterm performance evaluations increase student satisfaction in all three areas found in the literature, namely, with team members, with their own performance and grade, and with the overall course. Faculty can further encourage the evolution of intra-group trust during these midterm meetings with teams since they help students move from social interactions within their teams to more task-oriented interactions (Jarvenpaa & Leidner, 1999). Coppola et al. (2004) reinforce the importance of these midsemester meetings and suggest faculty involve students in meaningful project-related tasks during the semester. For example, students may be required to submit rough drafts of part of the term assignment or show proof that a specific and pre-determined portion of the assignment is successfully accomplished. By splitting the term assignment into smaller parts, the faculty member maintains student interest, involvement and higher performance while also providing the opportunity to offer task-related feedback.

In addition, as participants at our presentation of an earlier version of this paper suggested (personal communication with audience respondents at the 34<sup>th</sup> International Academy of Business Disciplines conference, March 31, 2023), students should be responsible for leading these team meetings while faculty members would provide feedback and act as a resource to help teams when needed. Otherwise, students typically depend on the faculty member to organize and control the interactions within the group. Also, one of the reasons for utilizing team projects is for students to learn how to interact with peer members. Students would learn to identify the presence of conflict relatively early and how to address it as quickly as possible to reduce its negative impact and strengthen intra-group trust. Effective conflict management further strengthens team trust and improves group performance.

Our literature review is in clear agreement regarding the importance of task-related feedback. Breaking up a larger semester-long project into smaller parts ensures students must continually interact as a team throughout the semester. This gives many opportunities to interact and provides students more affective-based data, which strengthens intra-group trust. Hence, a higher likelihood is created for team potential to be reached and performance/satisfaction to be maximized. The empirical studies cited throughout this paper suggest that this is a highly successful strategy and fits with our other recommendations for faculty to enhance student performance and satisfaction.

Finally, we notice that the suggestions made within the literature review and our recommendations presented within this paper are applicable to faculty members teaching either in-person or online courses. It appears that successful tools can be used and/or modified to fit most situations in which faculty try to improve teaching, student performance and satisfaction.

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# Conversations About Equity in Accounting Classrooms: Five Examples from Current Events

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## ABSTRACT

This paper provides accounting educators with resources to help them engage students in critical conversations about equity issues in accounting. Drawing from current events, we offer five example topics for classroom discussion across multiple areas of accounting. First, we discuss the equity implications of the use of facial recognition technology by the Internal Revenue Service. Second, we examine the equity impacts of layoffs. Third, we consider the use of blockchain technology in accounting to address global equity issues. Fourth, we discuss equity concerns related to the cashless economy. Lastly, we explore unique post-retirement benefit accounting requirements for the United States Postal Service and the organization's role in promoting economic and social equity. Each example includes background information, discussion prompts, and links to recent news articles that accounting faculty can use as course materials to facilitate meaningful discussions on equity-related topics.

**Keywords:** Accounting, DEI, Layoffs, Blockchain

## INTRODUCTION

Diversity, equity, and inclusion (DEI) are important topics that are at the forefront of many educators' and administrators' minds (Anderson, 2023). Yet many accounting faculty struggle with how to incorporate these topics into their classrooms (*Addressing Diversity*). Accounting is essentially a regulatory system; does it really have a role in DEI? The answer is a resounding yes.

DEI, ethics, and responsible business practices cannot be separated. As universities and businesses undertake initiatives related to DEI, equitable thinking must also pervade our teaching of business more broadly. Students in quantitative disciplines like accounting must be instilled with an understanding that numbers cannot be separated from the human beings who are impacted by them. Efforts to teach DEI in accounting should address the impacts of accounting policies, projects, and decisions on stakeholders, interpreted as broadly as possible. This should include consideration of equity impacts across races, ethnicities, and genders, as well as other demographic factors less commonly associated with DEI efforts, such as diverse socioeconomic, housing, and immigration statuses (among many, many others). Equity issues pervade all aspects of life and should be integrated into curricula equally deeply. While many business programs offer specific courses in business ethics (Litzky and MacLean, 2011), it is crucial that accounting students learn to think about issues of equity and ethics not in isolation, but holistically throughout their careers and lives.

Prior literature in accounting has examined how policies and interventions related to DEI can benefit students in terms of engagement, motivation, and outcomes (Ghio *et al.*, 2023; Hammond, 1995; Gallhofer *et al.*, 1999; Coetzee *et al.*, 2014). Other works discuss how to create more inclusive classroom climates and how to "decolonize" the classroom by rethinking how success is quantified (Ferraro *et al.*, 2005; Ghoshal and Moran, 1996; Bishop-Monroe and Garcia, 2023; Walstra and Chukwuma, 2023; Moore, 2023). These papers explore how instructors can be mindful of DEI while teaching accounting, but they do not explain how accounting topics are deeply rooted in DEI issues or how instructors can begin discussing these topics with students. This paper aims to close that gap and, at a more foundational level, to help accounting faculty understand the relevance of DEI to the accounting field, which is often regarded as purely technical.

We offer five example topics based on recent news and events, each one relating most closely to a different accounting course, that accounting faculty can use to facilitate classroom discussions about equity. The materials cited in this paper include many recent news articles from publicly available sources, which can be used as reading assignments

in accounting courses. Each topic is also accompanied by suggested discussion questions to help elicit meaningful conversations. This approach allows faculty to adapt their teaching as current events evolve over time; similar discussion prompts can be applied to the most recent news articles on these or similar topics.

## EQUITY TOPICS IN ACCOUNTING – EXAMPLES

### 1. IRS Use of Facial Recognition

*Course: Taxation*

In early 2022, the IRS began requiring people attempting to set up online accounts to do so using identity verification services through ID.me, a private company that has identity verification contracts with at least twenty-seven states and ten federal agencies (Stanley and Akselrod, 2022). ID.me requires users to upload a video selfie to its website, which then compares the video to a photo of the user’s government identification document (Gilman, 2022). Almost immediately after government agencies began using the ID.me verification system, users reported difficulties with the technology. The system was unable to recognize many people, “who then complained of waiting for days and weeks to reach a human ‘referee’” (Gilman, 2022). Following backlash against the use of biometric data for identity verification for tax purposes, in 2023, the IRS rolled back this requirement and added a second option involving a live or virtual interview with an IRS agent (*IRS Announces*, 2022; *TAS Tax Tip*, 2024).

The IRS’s use of facial recognition raised debate about the ethics and equity implications of using facial recognition technology in government applications. Though at first glance it may seem that technology should not be subject to human biases, many facial recognition algorithms are written by and trained on databases of mostly young, white males (Lohr, 2018). As a result, the technology can replicate and reinforce human biases (Walker, 2024). In particular, facial recognition technology is less effective at recognizing non-white faces (Boutin, 2019), women, non-binary people, the elderly, and children (Kugler, 2023). False positives in facial recognition introduce the possibility of these groups being disproportionately affected by tax fraud, while false negatives mean they will be disproportionately burdened by the inconvenience of troubleshooting or using an alternative method, which the IRS admits can be time-consuming (*IRS Direct File*).

In addition, stakeholders have raised concerns about a governmental agency using facial recognition technology, as it is not clear the use of such technology and data would be limited to tax purposes. If the downsides of facial recognition technology disproportionately negatively affect certain groups, those same groups could potentially be negatively affected by “surveillance, privacy, and free speech issues” (Kugler, 2023). Concerns “that government actors with access to the technology may abuse it for personal and inappropriate purposes... are heightened by the relatively low level of oversight and regulation of facial recognition technologies today” (Kugler, 2023). However, the use of facial recognition technology is still ubiquitous in other applications, both by governments and private enterprises, from airport customs to smartphones. Studies show people are generally comfortable with the use of facial recognition technology to investigate serious crimes and enhance public security, but they are often not comfortable with casual surveillance and are less comfortable with private companies using facial recognition compared to governments (Kugler, 2023; Dennehy, 2024). Experts say systems using facial recognition “shouldn’t be run by private companies, shouldn’t be exclusively online, and need to be closely audited” (Stanley and Akselrod, 2022).

As of 2024, users are still required to use ID.me to access the IRS’s Direct File system and to authenticate using either facial recognition or a video call with an ID.me agent. Biometric data used for facial recognition is not stored (*IRS Direct File*).

#### Discussion Prompts:

- What does facial recognition have to do with accounting? Has anyone heard about a related current event?
- Why would the IRS need to use facial recognition technology?
- Is there really a risk of identity theft when it comes to taxes? Why would someone ever want to fraudulently do someone else’s taxes for them?
- Has anyone used facial recognition to create an account with the IRS? What was your experience like?
- Would you feel comfortable scanning your face and/or identification documents to help the IRS prevent fraud? Why or why not?
- Do you currently use facial recognition for any other purposes? What are some advantages of these technologies?

- Are there any issues with using facial recognition? What are some downsides?
- Do these downsides have inequitable effects? Is anyone less likely to be recognized by facial recognition?
- Alternatives to facial recognition are available, but they may be more time-consuming. Is the loss of time a significant equity concern?
- What other applications might facial recognition technology or data be used for?

## 2. Reducing Labor Costs

*Course: Managerial / Cost Accounting*

Nearly every managerial and cost accounting course touches on the decision to make a part in-house or buy it from an outside supplier. This analysis is typically focused on choosing the profit-maximizing (cost-minimizing) option. This quantitative approach, while important, may neglect important qualitative aspects of the decision. To reduce labor costs means, by definition, to reduce payments to employees, and this reduction often comes in the form of layoffs. When students learn to quantitatively analyze the make vs. buy (or any other decision), they should also be trained to identify and consider the ethical and equity implications of that decision. Teaching the make vs. buy decision offers an opportunity to discuss the negative impacts of layoffs on both firms and employees and their interplay with DEI.

Layoffs can have a multitude of negative impacts on employees. Laid-off workers have decreased future earnings potential even decades later (Sucher and Westner, 2022; Cascio, 2003; Wachter *et al.*, 2011) and are at a greatly increased risk of developing a new health condition (Sucher and Westner, 2022; Strully, 2009). Layoffs can have negative consequences for companies as well, as short-term cost savings can come at the expense of long-term profitability (Sucher and Gupta, 2018; Cascio and Young, 2003), innovation (Sucher and Gupta, 2018; Amabile and Conti, 1997), customer loyalty (Sucher and Gupta, 2018; Williams, Khan, and Naumann, 2011), and reputation (Sucher and Gupta, 2018; Love and Kraatz, 2009). Firms also see increased burnout (Sucher and Gupta, 2018; Quinlan and Bohle, 2008; Woodward *et al.*, 1999) and voluntary turnover (Sucher and Westner, 2022; Quinlan and Bohle, 2008; Trevor and Nyberg, 2008) as well as declines in job satisfaction, commitment, and performance from employees who are *not* laid off (Sucher and Gupta, 2018; Sverke, Hellgren, and Näswall, 2002).

Layoffs can negatively impact a firm's DEI climate as well. Women, minorities, and marginalized communities are disproportionately affected by layoffs and their negative effects, as they are more likely to be working in roles considered nonessential (Kalev, 2016). When organizations conduct layoffs aimed at specific positions rather than evaluating workers individually, the proportion of white and Hispanic women and black, Hispanic, and Asian men in management positions drops by an average of nine to 22% (Kalev, 2016). One experimental study found that even when participants were given data on employees' performance and skills, they chose to lay off minority and older employees over low-performing workers (Dwyer and Arbelo, 2012). These equity impacts can lead to significant legal and reputational effects as well. For example, former employees filed a class action lawsuit against Twitter after the company laid off 63% of women in engineering roles compared to 48% of men, worsening an already skewed gender balance among the company's workers (Udavant, 2023). Netflix also faced backlash after laying off 150 employees, most of whom were women, people of color, and LGBTQIA+ (Udavant, 2023). Further exacerbating the issue, major employers have recently laid off employees in DEI-focused roles, with DEI jobs disappearing at nearly twice the rate of other roles (Ayas *et al.*, 2023).

Alternatives to layoffs include furloughs and voluntary buyouts. If layoffs are unavoidable, organizations should carefully consider their equity impacts. They may also consider options like helping employees find other jobs and providing support for education and entrepreneurship (Sucher and Westner, 2022).

### Discussion Prompts:

- How can companies reduce labor costs?
- Why do companies lay off workers?
- What are the pros and cons of layoffs?
- Are there potential equity implications of layoffs? Who tends to get laid off first?
- Are layoffs popular with stakeholders? Why or why not?
- Are there alternatives to layoffs?
- Is it possible to conduct layoffs without creating or exacerbating equity issues? How?

### 3. Blockchain in Accounting & Beyond

*Course: Accounting Information Systems*

The recently updated Certified Public Accountant licensing exam features a significant emphasis on technology and digital tools in accounting (*CPA Evolution*, 2021). One such technology that has garnered significant attention in recent years is blockchain. Transactions recorded on a blockchain are immutable, timestamped, encrypted, and linked to the previous block (Alarcon and Ng, 2018; Bonyuet, 2020). This allows for the easy verification of transactions and tracing of the flow of funds/goods, which could greatly streamline financial reporting and audit processes. With blockchain technology, tasks like bookkeeping and reconciliations can be largely automated, and auditors could feasibly audit all transactions rather than a sample; conduct audits on a continuous basis (Bonyuet, 2020; Kokina *et al.*, 2017); and automate, speed up, or even eliminate some audit procedures (*Blockchain Technology*, 2017). Supported by technology, managers and auditors will have less need to focus on recording and validating transactions and will increasingly emphasize “complex analysis, such as systemic evaluation, risk assessment, predictive audits, and fraud detection” (Bonyuet, 2020; *Blockchain Technology*, 2017).

Using these same tools, managers will have increased ability to identify ethical and equity issues in their businesses. In particular, blockchain technology can be used to increase transparency in supply chains and labor markets (Williams, 2024). Difficulties in tracing inventory and labor transactions have been a major contributor to global social issues, as companies cannot readily identify whether their inputs are ethically sourced. For example, “conflict minerals,” which are used in many consumer goods like electronics and cars, have been tied to terrorism, trafficking, and other human rights violations in the Democratic Republic of Congo and other conflict zones (Kapoor *et al.*, 2022; *Conflict Minerals*). Palm oil, which is in nearly half of consumer products from shampoo to chocolate to biofuel, is associated with deforestation and climate change, which disproportionately affect developing nations (Guivarch *et al.*, 2021; Young, 2019). The adoption of blockchain technology by firms in industries such as mining and oil production would allow purchasing firms and consumers to trace inputs back to their sources and choose ethically sourced products. This would require upfront efforts to verify the traceability and ethical production of the source product. Then, an immutable digital record of the raw material could be traced through the value chain as it is transformed from raw material into finished goods (Rosas and Cantoni).

Coca-Cola, along with the U.S. Department of State, is one company currently undertaking efforts to use blockchain to register its workers in an effort to combat the use of forced labor, which affects nearly 25 million people worldwide, many of them in the Asia-Pacific region (*Coca-Cola Will Verify*, 2018; *Global Estimates*, 2022). While the most obvious advantage of traceable, verified transactions to accounting may be auditing, blockchain technology enables accountants and managers to understand transactions more deeply and to leverage this information to address global social issues (Williams, 2024).

#### Discussion Prompts:

- What is blockchain? How does it relate to accounting?
- How might blockchain technology be applied across different areas of accounting (audit, tax, bookkeeping, etc.)?
- What kinds of accounts or transactions could benefit most from greater verifiability and traceability?
- How might increased traceability of transactions be used to support ethical and equitable business practices?
- How is the traceability of inventory in particular relevant to global equity issues?
- What other accounts or transactions are most strongly linked to global equity issues?
- How can blockchain technology help businesses ensure ethical labor practices?
- What challenges might companies face in implementing blockchain technologies?

### 4. The Cashless Economy

*Course: Financial Accounting*

Introductory accounting courses typically teach the accounting treatment of transactions involving cash, credit cards, and trade credit. Students without business experience may not be familiar with the distinction between trade credit and credit cards, and many students born in the 21<sup>st</sup> century have not lived in an economy where most transactions occur in cash. These students benefit from a thorough description of these types of transactions and a discussion of

the pros and cons of each. For example, offering trade credit comes with the risk of nonpayment, which students typically learn to account for as bad debts.

In recent years, the U.S. has been moving toward a nearly cashless economy. The number of transactions completed in cash has been steadily declining, shrinking from 31% to 18% in just six years from 2016 to 2022, and 41% of U.S. adults now say they don't make any cash purchases in a typical week (Lindsay, 2023). A cashless economy comes with pros and cons. It may be more convenient for consumers, lower the risk of fraud (via encryption and digital record keeping) and theft (Gazeley, 2022), and help users earn rewards and build credit. However, a cashless economy creates other issues, such as privacy concerns and equity issues.

First, access to credit and the banking system more broadly is not universal, and access to banking services varies along racial, ethnic, and socioeconomic lines. As of 2021, 11.3% of Black households and 9.3% of Hispanic households did not have a checking or savings account, compared to just 2.1% of white households (*2021 FDIC National Survey*, 2023). Low-income Americans tend to rely more on cash than those with higher incomes (Faverio, 2022), as do older adults and people with low financial literacy (Conybeare, 2024; Barcellos and Zamarro, 2019). Groups such as those experiencing homelessness, refugees and other migrants, and very young people may be excluded from the banking system altogether (De Marco *et al.*, 2015; Zhang, 2023; Conybeare, 2024).

This poses a problem, as some businesses have transitioned to fully cashless (Conybeare, 2024). The public responded with confusion and even anger to businesses refusing to accept cash, and some speculated that this may even be illegal (Sadeghi, 2020). Close inspection of a U.S. dollar bill reveals the phrase “legal tender, for all debts public and private.” This wording provides an opportunity to reinforce to students the differences between cash outflows, expenses, and debts. There is, in fact, no federal statute requiring businesses to accept cash payments (*Is It Legal*, 2020). However, in response to equity concerns, several states and municipalities have recently passed or are considering legislation that requires businesses to accept cash (Horvath, 2024).

#### **Discussion Prompts:**

- What are the costs and benefits of offering credit to customers?
- What's the difference between trade credit and credit cards? How does their accounting treatment differ?
- What are the pros and cons to customers of paying in cash and on credit?
- Is it ethical for business to refuse to accept cash? Is it legal?
- Are there any equity issues associated with cash or credit transactions?
- Who suffers if businesses do not accept cash?
- Who might be excluded from the credit system?

### **5. USPS & Accounting for Post-Employment Benefits**

*Course: Intermediate Accounting or Governmental & Nonprofit Accounting*

For over 15 years, the United States Postal Service's expenses have consistently exceeded its revenues (*U.S. Postal Service Faces More Financial Losses*, 2023), in part because its revenue has been negatively impacted by increased competition from private delivery services. In addition, from 2007 to 2022, the USPS was required to report significant and unique expenses related to its employee post-retirement benefit obligations. During this period, the Postal Accountability and Enhancement Act (PAEA) of 2006 required the USPS (unlike any other governmental agency or private company) to pre-fund future retiree health benefits 75 years in advance. This required the USPS to set aside an initial \$72 billion in cash for employee post-retirement benefits before employees were eligible to retire – and even before they were hired at all. (Anderson *et al.*, 2019; Connor and Turow, 2010; Renfroe, 2020). The PAEA also mandated USPS to invest funds exclusively in government bonds, which typically earn low rates of return (Spross, 2018). The cost of compliance with the PAEA imposed a significant financial burden on the USPS, as well as prohibiting it from investing in capital projects and research and development aimed at future growth (Spross, 2018; Baker, 2013). While the stated intent of the prefunding requirement was “to protect future retiree benefits, recognizing that future postal revenues might be insufficient to cover them,” (*Funding of Postal Retiree Health Benefits*, 2022), stakeholders speculated that proponents of small government endorsed the requirement to intentionally financially burden the Postal Service and thereby provide a justification for privatizing it (Spross, 2018).

Critics of the PAEA argued that USPS provides important social goods and should not be unfairly burdened by the prefunding requirement (Steidler, 2022). More broadly, others argued that the USPS should not be compelled to



generate profits at all. For over a century, Congress covered any deficits the Postal Service incurred, with federal law even stating the USPS was “clearly not a business enterprise conducted for profit” (John, 2020). In its early history, the USPS provided social goods in the form of low-cost, non-preferential circulation of newspapers and other information related to business, public policy, and personal matters. Deficits were expected, as this mission was a costly one (John, 2020). Today, some might think this mission is all but obsolete in the face of nearly universal email access and decreasing reliance on physical mail. But the USPS still provides many important social goods that enhance economic, social, and political equity.

The USPS provides low-cost delivery services everywhere in the U.S., including rural areas that are not served by private carriers (Pindus *et al.*, 2010). Those without internet access, which includes 17% of White families and 32% of Black families (*Internet, Broadband Fact Sheet*, 2024), rely on the USPS to pay bills and perform other personal financial tasks. Individuals without bank accounts or identification documents, often low-income and immigrant populations, can receive and cash money orders at the Post Office (Pindus *et al.*, 2010). The USPS provides mailing addresses, which are essential for most job applications, to those without permanent addresses, such as people experiencing homelessness (Pindus *et al.*, 2010). Small and rural businesses benefit from the USPS’s affordable rates and wide distribution as well, which helps “counter the concentration of economic power” (Morrissey, 2020). The USPS also provides reduced mailing rates for nonprofits (Pindus *et al.*, 2010).

Post Offices also build community, especially in low-income and rural areas. They provide stable employment opportunities, particularly for minorities and those without college degrees (Pindus *et al.*, 2010). Mail carriers are “a source of social contact for isolated populations” and can watch over neighborhoods and report “potential dangers or problems” like fires, accidents, falls, missing persons, etc., as well as disseminating information in emergencies (Pindus *et al.*, 2010). Post Offices often define the “Main Street” of a neighborhood, and closures can be interpreted as signals that the government has given up on a community (Pindus *et al.*, 2010).

The USPS also provides key services such as voter registration, absentee ballot applications (Lewin, 2008), passport services, and federal tax forms (Pindus *et al.*, 2010) that citizens might prefer not to outsource to a private company. The Postal Service plays a critical role in “ensuring trustworthy mail balloting,” (Pindus *et al.*, 2010), which has been shown to increase voter turnout, particularly among women, young people, and the disabled (Thompson *et al.*, 2020). The USPS also assists with the national decennial census (Pindus *et al.*, 2010).

In summary, the USPS serves many key economic, social, and political functions that promote equity among Americans. Its income statement is interesting to analyze, and the PEAE provides an interesting case example on post-retirement benefit accounting. But it also raises a larger debate about the profit motive of social goods.

In 2022, President Biden signed the Postal Service Reform Act, which eliminates the prefunding requirement, providing \$57 billion in relief to the USPS over a 10-year period (Shepardson, 2023). A one-time, non-cash benefit associated with this regulatory change was recognized in net income in 2022 (Partenheimer, 2022).

#### **Discussion Prompts:**

- Why is the USPS unprofitable? (Students will likely be able to identify issues related to revenue-generation.)
- Has anyone heard of anything interesting related to USPS’s expenses?
- Why might the USPS be required to prefund retiree benefits? Does this seem like a reasonable business practice?
- Given that the USPS is not a for-profit business, should it aim to be profitable? Why or why not?
- The USPS once existed to provide equitable access to mail. Is this still a relevant pursuit in today’s society? Why or why not?
- Does the USPS increase equity? How? What social goods does it provide?

#### **CONCLUSION**

This paper provides accounting educators with resources to help them incorporate discussions of equity issues into various accounting courses. Drawing from current events, we offer five example topics with relevant source materials and discussion prompts for use in the classroom. This paper aims to foster a deeper understanding of the intersection

between accounting and equity issues. Though accounting is often regarded as a purely technical discipline, instructors can empower future professionals to promote equity and social responsibility in their careers by integrating DEI topics into their curricula.

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# Teaching PFAS Under the New CPA Model Curriculum

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## ABSTRACT

Under the new American Institute of Certified Public Accountants (AICPA)-National Association of State Boards of Accountancy (NASBA) Certified Public Accountant (CPA) Evolution Model Curriculum, students seeking to take the Tax Compliance and Planning (TCP) section of the uniform CPA exam will be evaluated heavily on Tax Compliance and Planning for Individuals and Personal Financial Planning. While some undergraduate and graduate finance curricula include personal financial planning, most accounting curricula do not. When modifying their accounting curricula to meet the new CPA exam specifications, universities must address how to cover and deliver new content areas. As many accounting instructors may have never focused on personal finance or financial planning, this may be a new and unfamiliar area for them. This paper aims to describe the proposed learning objectives of the course in Personal Financial Advisory Services (PFAS) recommended by the AICPA-NASBA CPA Evolution Model Curriculum. In addition, the paper provides current accounting instructors with the best pedagogy for delivering such courses based on prior research as well as provides accounting faculty with recommended resources to assist with curriculum development.

**Keywords:** CPA Evolution Model Curriculum, Personal Financial Advisory Services, AICPA, NASBA

## THE INTRODUCTION OF PFAS

College courses in personal finance or general financial planning have been taught for many years at the undergraduate level, as electives or specifically for Finance majors. Due to the evolving role of CPAs as planners and advisors, the new AICPA-NASBA CPA Evolution Model Curriculum includes a recommended course on Personal Financial Advisory Services (PFAS) to properly prepare accounting students for the new Tax Compliance and Planning (TCP) section of the CPA exam. This recommendation corresponds to the AICPA's recent introduction of the Personal Financial Specialist (PFS) credential. The PFS credential was announced by the AICPA in 2018 and can be earned by current CPAs after completing five certificate courses (Association of International Certified Professional Accountants, 2018). The first four courses cover the core technical areas of personal financial planning as determined by the AICPA: retirement, estate, risk management/insurance, and investment planning. The fifth course covers the practical application of the planning process with tax considerations integrated throughout all courses.

The introduction of the certificates program leading to the PFS designation was a timely one as an estimated 10,000 baby boomers will turn 65 each day from 2016 to 2026. (Association of International Certified Professional Accountants, 2018). During that same time, employment of personal financial planners is expected to grow by 15%, much faster than other occupations. As generational wealth changes hands and taxpayers continue to rely more heavily on their CPAs as trusted advisors in all facets of their lives, the PFS designation helps CPAs expand on their knowledge in this area while indicating to current and prospective clients their expertise in personal financial planning services. In conjunction with those rising demands for CPAs to meet the needs of clients in the personal financial planning area, the AICPA-NASBA CPA Evolution Model Curriculum introduced a recommended course on PFAS to not only help prepare students for the TCP discipline section of the CPA exam but also prepare them for a career which may involve financial planning with and for clients.

The AICPA and NASBA developed the CPA Evolution Model Curriculum to assist faculty in preparing their students for the new Core + Disciplines, CPA licensure model of the CPA exam (National Association of State Boards of Accountancy, Inc. [NASBA], 2021). This new licensure model for the CPA exam was developed to ensure newly licensed CPAs have the deeper skill sets, additional competencies, and increased knowledge of emerging technologies demanded by the profession. The CPA Evolution Model Curriculum covers all necessary content for future CPAs for the three core exams (Accounting and Data Analytics, Audit and Accounting Information Systems, and Tax) as well as the three optional disciplines (Business Analysis and Reporting (BAR), Information Systems and Controls (ISC), and Tax Compliance and Planning (TCP)). It does not, however, specify any opinion on whether the material should be covered at an undergraduate or graduate level, as the AICPA and NASBA leave these decisions up to each

accounting program. They also make it very clear that the Model Curriculum should be viewed as a roadmap for faculty, with each accounting program considering its unique circumstances, limitations, and needs of its employers.

### **The Recommended PFAS Curriculum**

As shown in Figure 1, the PFAS Model Curriculum suggests covering 20 learning objectives from three broad topic areas (NASBA, 2021). It also recommends that these topics and learning objectives either be covered in a stand-alone course on PFAS or within a course covering Individual Compliance and Planning (ICP). We firmly believe that stand-alone courses in PFAS, ICP, and Entity Compliance and Planning (ECP) are warranted to prepare students for the entire TCP discipline exam.

#### **Figure 1: PFAS Model Curriculum**

##### **Topic 1: Individual Tax Planning**

Summary: Discuss individual tax planning, including tax reduction/management techniques, timing of income and expenses, tax consequences of various charitable/philanthropic giving options, and professional standards.

##### **Learning objectives:**

1. Identify data used to help clients establish their financial and tax goals.
2. Discuss practices and techniques that will help clients minimize their tax liability based on various factors, including the tax return and the potential transactions.
3. Recognize that developing a holistic financial plan must include the client's full personal and business picture and their personal goals, including all elements (retirement, investments, business succession, charitable giving, wealth transfer, education, etc.).
4. Explain the various education plans available for tax planning.
5. Recall that professional standards related to these planning topics are covered in the AICPA Statement on Standards in Personal Financial Planning Services.

##### **Topic 2: Estate, Gift, and Trust Taxation, Compliance, and Planning**

Summary: Explain concepts related to gift taxation, compliance, and planning

##### **Learning objectives:**

1. Recall allowable gift tax deductions and exclusions for federal gift tax purposes (identification of property transfers subject to gift tax, payments exempt from gift tax).
2. Calculate the amount subject to gift tax and the basis of an asset received as a gift.
3. Identify the basics and significance of the adequate disclosure requirements.
4. Explain the basics of valuation principles and the concept of valuation discounts.
5. Identify key tax credits and what actions are needed to qualify for the credit.
6. Explain the basic limitations of using tax credits.
7. Explain the basics of how to reduce estate and gift taxes.
8. Identify the inclusion of assets at fair market value in a decedent's estate tax return.
9. Explain deductions allowed in an estate tax return.
10. Explain the concept of a unified credit for estate and gift tax purposes.
11. Determine a taxpayer's basis and holding period of an asset received through an inheritance.

##### **Topic 3: Retirement Planning**

Summary: Describe concepts related to retirement planning.

##### **Learning objectives:**

1. Describe various retirement vehicles available and how they fit into financial planning.
2. Review limits on and tax consequences of contributions to or distributions from retirement plans. Specifically, address and distinguish between deductible and nondeductible Individual Retirement Accounts (IRA), Roth IRAs, SEP plans, SIMPLE plans, 401(k) plans, and 403(b) plans. Review concepts as to when an individual, self-employed

individual, or small business would choose to use the various types of retirement plans, and the resulting income tax consequences. Also, coordinate these choices with how the plans will contribute to the individual's ultimate retirement goals.

3. Determine cash requirements to realize retirement goals.
4. Describe planning for post-retirement succession of a closely held business.

While these robust topics and learning objectives will certainly help prepare students for the Tax Compliance and Planning for Individuals and Personal Financial Planning section of the TCP discipline exam, which is 30-40% of the overall exam, it does not cover other areas of necessary knowledge for practice in this field (Association of International Certified Professional Accountants, 2023). In considering the curriculum for a standalone PFAS course faculty must ensure that they are not only preparing students for the coverage on the CPA exam but also the issues related to providing these services in practice. These issues include but are not limited to those covered in the AICPA's Statement on Standards in Personal Financial Planning Services (SSPFPS No. 1), which was issued to provide authoritative guidance and establish enforceable standards for members practicing in these areas. SSPFPS No. 1 covers areas paramount to practice for CPAs undertaking personal financial planning engagements such as general professional responsibilities, planning the engagement, developing, and communicating recommendations, using advice provided by other service providers, and more (Association of International Certified Professional Accountants, n.d.).

## **THE CHALLENGE FOR FACULTY**

Before the new Core + Disciplines CPA licensure model and the development of the TCP discipline exam including PFAS, accounting faculty may not have professional experience (teaching or practicing) in personal financial planning. Luckily, the AICPA has provided numerous resources to assist faculty in preparing and teaching this course.

In 2017, the AICPA released the Model Personal Financial Planning (PFP) Curriculum to align with the launch of the new PFS designation for CPAs (Association of International Certified Professional Accountants, 2017). This resource was designed for accounting educators so they could develop or modify existing accounting curricula to best prepare students for the public accounting profession. It also provides recommendations for designing the PFP component of any accounting curriculum, to address and promote the AICPA's Vision, the AICPA PFP Section's mission, and the pathway to becoming a CPA financial planner or CPA/PFS. While this curriculum was developed before the launch of the PFAS-recommended course as part of the new Core + Disciplines CPA licensure model, it still serves as a significant conceptual map for the course.

The PFP Model Curriculum provides learning objectives similar to those recommended under the PFAS module of the full AICPA-NASBA CPA Evolution Model Curriculum. Furthermore, it provides faculty with a variety of active teaching methods to achieve the learning outcomes aligned with their institution's and program's missions. Recommended pedagogy includes active learning approaches such as in-class discussions, student presentations, practitioner presentations, cases and simulations, role-plays, and service-learning activities (Association of International Certified Professional Accountants, 2017). Accordingly, assignments should enable students to gain knowledge of the learning objectives while also developing their communication, critical thinking, and interpersonal skills. The model suggests that while traditional problem-solving can reinforce independent reading and lectures, the use of financial literacy workshops, presentations, and interaction with state and local accounting societies are also effective strategies for developing individual competencies and meeting the learning objectives of personal financial advisory services courses. The model curriculum also provides faculty with a sample syllabus including several recommended texts and readings, websites for additional student resources, course assignments, course schedules, and project examples.

### **Additional Faculty Resources**

In addition to the vast resources provided in the PFP Model Curriculum, the AICPA has also offered several other resources to support faculty in preparing to teach accounting students this new discipline. The Standards in PFP: Compliance Toolkit is available to PFP Section members and CPA/PFS credential holders (Association of International Certified Professional Accountants, n.d.). This toolkit includes nonauthoritative resources and guidance to assist with the compliance of SSPFPS No. 1. Included in those resources are a compliance manual, flowcharts, webcasts, checklists, sample engagement letters, frequently asked questions, investment advisory business models,

and PowerPoint slides, all of which may be extremely useful in preparing active learning activities as recommended by the AICPA.

PFP section memberships are free to students and instructors and provide additional resources that are useful in the classroom, including access to a Personal Financial Planning podcast, Personal Finance Scorecard, and videos illustrating how a CPA can use information from a client's tax return to provide valuable financial advice (Smith, 2024). It should be noted that students may also sit for the PFS exam at any time for no charge.

## **PEDAGOGY IN FINANCIAL PLANNING COURSES**

While the AICPA PFP Model Curriculum supports an active learning approach to teaching financial planning, accounting faculty with little experience in the discipline will need assistance in employing the most effective pedagogical methods to ensure student success. Cull and Davis (2012) suggest that the use of educational techniques and strategies involving active learning are essential to students' success in financial planning education. Active learning may best be achieved through case studies or 'real world' class assignments. Given the complexity of financial planning along with the lack of financial planning background of many students, scaffolding was seen as the most appropriate educational tool to design, introduce, and assess financial planning learning objectives.

With scaffolding pedagogy, the instructor enables students to participate in complex tasks that they may otherwise struggle to complete without significant assistance. Taken from the same term in the building industry, scaffolding involves providing support or assistance that is gradually taken away until the students can support themselves in learning. Cull and Davis (2012) found that students viewed the scaffolded learning approach as a positive learning experience and a good method for acquiring the necessary quantitative and qualitative knowledge and skills.

A study conducted by Cowen et al. (2011) also supported the scaffolded approach to teaching financial planning, by supporting students specifically on a final assignment of preparing a personal financial plan. Before the adoption of the scaffolded approach, 56% of students received failing grades on the assignment. With the development and adoption of an appropriate framework, as provided by SSPFPS No. 1, and by providing guidance and structure in the form of scaffolding leading up to the assignment, they found that not only did the students prefer a scaffolded approach, but that it also proved successful in building confidence and mastery of financial planning. Over a four-year study period, there was significant improvement in students' pass rates, with only 19% failing, and higher grades overall.

## **CONCLUSION**

While the newly recommended PFAS course under the AICPA-NASBA CPA Evolution Model Curriculum may seem daunting to some accounting faculty, particularly those with no practical experience in the area, several resources distributed by the AICPA are available to assist in curriculum development. Utilization of these resources and adopting a scaffolded approach and active learning, requiring students to actively engage in each step of the learning process, has shown to be an effective strategy for ensuring student success in PFAS and PFP content courses.

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# Unemployment Rate and the Core Job Skills Demanded: Implications for Graduates

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## ABSTRACT

Human capital is critical to the success of an organization. Over the years, researchers have attempted to identify job skills demanded by employers. The present study extends that stream of research by exploring the demand for these skills in the context of broader economic conditions using the unemployment rate as a proxy and identifying the core skill set in the process. This core skill set may serve as the starting point from which to build other soft skills. Development of these skills can positively impact the career growth of recent college graduates and contribute to the competitiveness of the organizations they work for.

**Keywords:** soft skills, unemployment rate, skill mismatch, curriculum design, career pathways, candidate quality

## INTRODUCTION

Consider two colleagues at your workplace: colleague A and colleague B. Both of them have necessary technical skills for the job but colleague A has a positive attitude and is a team player, is flexible, creative, empathetic, and collaborative compared to colleague B. With whom would you enjoy working? The answer is most likely - colleague A. Why? While both colleagues A and B have 'hard skills,' colleague B lacks adequate 'soft skills.' Literature suggests that not only do coworkers enjoy working with a colleague like A, but an organization with employees like A is more likely to be productive.

Hard skills are technical, tangible, measurable competencies. These skills are often acquired through formal education with the goal to attain a professional, technical, or academic qualification. Hard skills help individuals perform certain specific tasks. On the other hand, soft skills are a combination of interpersonal and social skills which are non-technical competencies associated with one's personality, attitude, and ability to interact effectively with others. In this paper, we attempt to understand soft skills demanded from college graduates by employers and the interplay between hard and soft skills. We also explore whether economic cycles play a role in the type of skills demanded by the market and implications for college students/graduates.

## LITERATURE REVIEW

Human capital is critical to the success of an organization and, hence, organizations pay very close attention to hiring college graduates with the right set of job skills. So, it is not surprising that a large number of studies have attempted to identify job skills demanded by employers. One early attempt made by Posner (1981) asked recruiters to rate a list of applicant characteristics which were then classified into three groups according to importance: most important, intermediate importance, and least important. Some studies tried to understand college graduates' perspectives on job skills they thought employers' demanded. For example, Kaplan (1985) surveyed senior level business students and human resource managers to understand their perspectives on the importance of different characteristics for college graduates seeking entry-level positions. The author concluded that the students had a very incomplete view of what human resource managers deemed to be important and failed to recognize the importance of basic qualities such as initiative, high personal standards, and emotional maturity.

Later, Robles (2012) identified the top ten soft skills employers demanded based on feedback from business executives. These skills included integrity, communication, courtesy, responsibility, social skills, positive attitude, professionalism, flexibility, teamwork, and work ethic. The author echoed the business executives' sentiment that efforts to develop soft skills should be viewed as an investment. Based on the literature, in the context of a knowledge economy and high-performance work systems, Carnevale and Smith (2013) categorized skills and abilities demanded by employers as follows: (1) Basic skills (reading, writing, and mathematics); (2) Foundation skills (knowing how to learn); (3) Communication skills (listening and oral communication); (4) Adaptability (problem solving and creative thinking); (5) Group effectiveness (interpersonal skills, negotiation, and teamwork); (6) Influence (organizational effectiveness and leadership); (7) Personal management (self-esteem and motivation/goal setting); (8) Attitude (cognitive style) and (9) Applied skills (occupational and professional competencies). The author noted that these

competencies interact with each other and are multi-dimensional in nature which requires early intervention and creation of adequate infrastructure at the societal level to make the workforce career ready. The stream of research trying to identify job skills needed by different stakeholders' (such as employers, recent college graduates, and faculty members) perspectives continued over the years.

More recently, Majid et al. (2019) showed that gaps continued to exist between skills employers demanded and the skills possessed by college graduates, particularly with respect to soft skills. Similar findings were echoed by several researchers who commented that college graduates were not prepared for the job market. A review of the literature shows a widening gap between employer expectations and college graduate abilities regarding soft skills (Stewart and Marciniak, 2016; Singh and Jaykumar, 2019). This gap is concerning as these soft skills are needed in every field of work and the literature has documented the critical role these soft skills play for employability and professional growth of graduates in areas such as accounting, finance, management, marketing, information systems, project management, engineering and technology to name a few (Levasseur, 2013; Harun et al., 2017). Literature also underscores the demand for these soft skills and the gap that exists in the workforce both in developed and developing countries in the globalized marketplace (Jackson, 2010; Al Shayeb, 2013). Thus, the need for soft skills is acknowledged across different disciplines, geographical boundaries, and economic conditions. Without commensurate soft skills, hard skills are just a set of tools. The effectiveness of hard skills stems from their interaction with soft skills (Balcar, 2016).

Literature also suggests that not only do coworkers enjoy working with a colleague like A who has adequate soft skills (as was mentioned in the introduction), but an organizational team consisting of employees like A is more likely to form a high performance work system and be more productive (Becker and Huselid, 1998). This, in turn, helps the organization attain a sustainable competitive advantage in the marketplace, according to the resource-based view of the firm. The resource-based view of the firm (RBV) postulates that resources which are rare, valuable, inimitable, and nonsubstitutable can provide sources of sustainable competitive advantages (Barney, 1991). Employees with soft skills, in addition to their hard skills, foster critical thinking and problem solving, and can create such a resource that is rare, valuable, inimitable, and nonsubstitutable due to causal ambiguity arising from complex interactions among people, process, and technology (Dunford et al., 2001; Saá-Pérez and García-Falcón, 2002). For this reason, companies strive to hire employees with soft skills in addition to their hard skills. While desirable hard skills (technical skills) vary from one company to another based on the type of business (Alphabet Inc. i.e., Google mostly hires employees with computer programming skills, but 3M Company mostly hires employees with skills in chemistry and other engineering fields, for example), soft skills are desirable for all type of businesses.

Economic cycles (economic boom and bust) also play a role in technical skills demanded by employers. During a period of economic growth, the number of jobs in the growth sector of the economy increases drastically creating a high demand for job candidates with technical skills in that sector. The Bureau of Labor Statistics (BLS) and the media expose those growth areas of the economy, highlighting the hard skills in demand. Students contemplating college degrees get in those fields with high demands. After a few years, sometimes even before those students graduate, the economy cools down and the demand for hard skills in those growth areas diminishes. Recent college graduates seeking jobs accept positions from the available job pool even when these jobs do not match their technical skills, particularly during recessionary periods. This creates what is known as cyclical skill mismatch, which results into long-term career loss for college students graduating in a recession (Liu et al., 2016). While the impact of economic cycles on hard/technical skills have been studied, the impact of economic cycles on soft skills demanded from college graduates has not received much attention in the literature. The present study attempts to fill in this gap in the literature. More specifically, the present research intends to understand differences in soft skills demanded from recent college graduates during a period of economic growth (period experiencing low unemployment rate) and an economic downturn (period experiencing high unemployment rate). Additionally, this research attempts to identify if a set of soft skills or 'core skills' exists that are equally in demand during both the periods of high and low unemployment rates.

## **DATA COLLECTION**

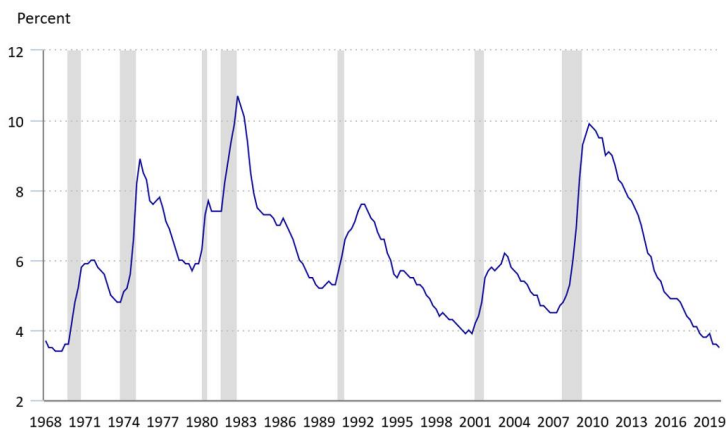
The National Association of Colleges and Employers (NACE) is a professional association for recruiting practitioners, college career services and other business affiliates, which facilitates the employment of the college educated. For over twenty-five years, NACE has conducted an annual survey of what employers and job candidates (graduating seniors and recent graduates) want from each other. The results of these surveys have been used by the employers for their recruiting purposes. NACE sampled fewer than ten Minnesota employers and even fewer that recruited from Saint Cloud State University (SCSU). To understand issues considered most important for the Midwest employers,

SCSU has conducted the Minnesota College Job Outlook survey since 2004. This survey was patterned after the NACE survey. However, based on the feedback received from the employers, this survey has evolved over the years to reflect factors considered most important for Midwest employers. The Minnesota College Job Outlook (MCJO) survey collected data from organizations that participated in three primary college job fairs in Minnesota state and the Career Day organized by the Herberger Business School. The employer lists from these events were combined and duplication and unreachable email addresses were eliminated. Two follow up emails were sent to non-respondents to encourage them to fill out the survey. Respondents represented a wide variety of public and private organizations including business services, financial services, telecommunications, education, healthcare, government, the military, manufacturing, non-profit/human services, retail, and restaurant/hospitality. The HR professionals (primarily recruiters) responded to the MCJO surveys. These respondents were asked to rate the skills that they felt most important for entry level [job] candidates to possess. Data were collected from two time periods for this study as follows:

**High Unemployment Period (HUP)** – This is the time period between 2009 and 2010 when the unemployment rate was very high. Data were collected from the Minnesota College Job Outlook (MCJO) surveys conducted in 2009 and 2010, when the unemployment rate ranged between 9.8% and 9.5%, and peaked at 10%. This period encompassed the most depressed job market since the early 1980s (see Figure 1). The average response rate for the surveys during this time period was 34.7%, and 127 employer responses were found to be useful after eliminating surveys with missing values.

**Low Unemployment Period (LUP)** – This is the time period between 2016 and 2017 when the unemployment rate was low. Data were collected from the Minnesota College Job Outlook (MCJO) surveys conducted in 2016 and 2017, when the unemployment rate ranged between 4.8% and 4.7%, and the job market continued to improve in subsequent months (see Figure 1). The average response rate for the surveys during this time period was 46.2%, and 132 employer responses were found to be useful after eliminating surveys with missing values.

**Figure 1. Unemployment rate (seasonally adjusted)**



Note: Shaded areas represent recessions as determined by the National Bureau of Economic Research.  
Source: U. S. Bureau of Labor Statistics.

## METHODOLOGY, DATA ANALYSIS, AND RESULTS

Employers' mean responses (i.e., the mean ratings on important skills for entry level [job] candidates to possess) during the High Unemployment Period (HUP) and the Low Unemployment Period (LUP) were compared using the Independent Samples t-test. This test requires the assumption of homogeneity of variance. First, Levene's test for equality of variances was performed before comparing the differences in mean responses between the two periods. Next, the pooled sample standard deviation was used to calculate the t-test statistic if Levene's test indicated that the variances were equal. Alternatively, the Welch t-test statistic was used if Levene's test indicated that the variances were not equal.

The results of the Independent Samples t-test are shown in Table 1. Based on these mean ratings, the skills for entry level jobs can be grouped into three categories as follows:

Skills of highest importance

Skills in this category were rated above 4.5 (out of 5) in both the High Unemployment Period (HUP) and the Low Unemployment Period (LUP). These top rated skills included Communication (verbal and written), Honesty/integrity, Interpersonal skills (relates well to others), Strong work ethic, and Teamwork skills (works well with others). The differences of means of employers’ ratings on these skills between the two time periods (HUP and LUP) were found to be not statistically significant (NS), as indicated in Table 1.

Skills of higher importance

Skills in this category were rated above 4.0 (out of 5) but below 4.5 in either the High Unemployment Period (HUP) or the Low Unemployment Period (LUP). These skills included Flexibility/adaptability, Motivation/initiative, Leadership skills, Organizational skills, Think analytically, and Utilize technology. The mean of employers’ responses differed significantly ( $p \leq 0.01$ ) for these six skills between the two periods, as indicated in Table 1. These differences in mean responses were found to be significant even after using a Bonferroni correction to guard against an increased likelihood of Type I error associated with multiple comparisons.

Skills of high importance

Skills in this category were rated below 4.0 (out of 5) in both the High Unemployment Period (HUP) and the Low Unemployment Period (LUP). These skills included Professionalism/etiquette and Ability to acquire learning. The differences of means of employers’ ratings on these skills between the two time periods (HUP and LUP) were found to be not statistically significant (NS), as indicated in Table 1.

**Table 1: Important Skills for Job Candidates to Possess**

What skills do you feel are most important for entry level [job] candidates to possess? Please rate each on a scale of 1 to 5, with 1 = Not at all important and 5 = Extremely important.					
Skill	High Unemployment Period (HUP)		Low Unemployment Period (LUP)		Mean Difference
	Mean	sd	Mean	sd	
Ability to acquire learning	3.45	1.08	3.65	1.01	-0.20
Communication (verbal and written)	4.79	0.45	4.86	0.34	-0.07
Flexibility/adaptability	4.39	0.68	3.98	0.77	0.41*
Honesty/integrity	4.83	0.37	4.77	0.61	0.06
Interpersonal skills (relates well to others)	4.66	0.51	4.73	0.45	-0.07
Leadership skills	3.9	0.93	4.27	0.73	-0.37*
Motivation/initiative	3.95	0.92	4.31	0.81	-0.36*
Organizational skills	4.17	0.75	3.81	0.77	0.36*
Professionalism/etiquette	3.57	0.96	3.72	1.04	-0.15
Strong work ethic	4.54	0.59	4.62	0.64	-0.08
Teamwork skills (works well with others)	4.6	0.62	4.52	0.64	0.08
Think analytically	3.78	0.78	4.16	0.74	-0.38*
Utilize technology	4.13	0.71	3.8	0.86	0.33*

\*  $p \leq 0.01$

The nonparametric Mann-Whitney U Test is suggested to ensure robustness of the results when the dependent variable may not be normally distributed. Therefore, this test was run; the results were consistent with those shown in Table 1. This serves as validity and sensitivity analysis of the results reported in Table 1. In the following paragraphs, we expand on the three categories: ‘Skills of highest importance,’ ‘Skills of higher importance,’ and lastly ‘Skills of high importance.’

Skills of highest importance - The mean rating of employers' responses on skills that fell under this category were high during both the time periods (HUP and LUP). In addition, the differences in means of employers' responses were not statistically significant between these two time periods (HUP and LUP). This indicates that the skills that fell under the category 'Skills of highest importance' have been deemed very important during the High Unemployment Period (HUP) as well as during the Low Unemployment Period (LUP). That is, these are the skills that are demanded by employers during bad economic times as well as good economic times and form a core skill set. In other words, the present study goes beyond just identifying the job skills that are highly demanded by the employers. It also pinpoints a set of core skills sought regardless of economic conditions. These skills are mutually reinforcing and impact the quality of teamwork which is indispensable for effective and efficient functioning of an organization. For example, skills such as communication (verbal and written), interpersonal skills (relates well to others), and strong work ethic directly contribute to teamwork skills (works well with others), and honesty/integrity creates an environment where team members can trust each other. Thus, a company having employees with this core skill set is expected to perform well in the marketplace.

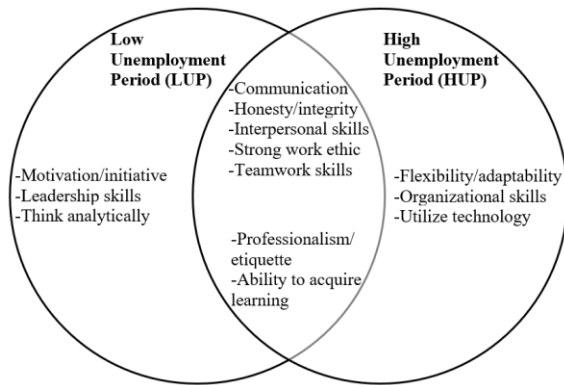
Skills of higher importance - The mean rating of employers' responses on skills in this category were not as high as those skills that fell under the category 'Skills of highest importance.' However, these skills (Skills of higher importance) were rated relatively high (above 4.0 out of 5 but below 4.5) in one of the two time periods (HUP and LUP). Moreover, the differences in means of employers' responses on these skills were highly statistically significant between these two time periods. This indicates that the skills in the category 'Skills of higher importance' have been deemed to be more important in one of the two periods than in the other. As Table 1 shows, Flexibility/adaptability, Organizational skills, and Utilize technology were considered more important during the High Unemployment Period while Motivation/initiative, Leadership skills, and Think analytically were considered more important during the Low Unemployment Period.

There is no easy way to explain why employers would deem some skills more important in one period than the other. Perhaps, employers consider 'flexibility/adaptability,' 'organizational skills,' and 'utilize technology' more important during the High Unemployment Period because during this period of economic contraction employers want to maintain the status quo to pass this period economic downturn. Employers would prefer to have employees who show 'flexibility/adaptability' in terms of different types of work they are willing to pick up as needed. Employees' flexibility/adaptability with respect to work schedule (days and hours worked) would also be desirable to the employers. Employers are usually reluctant to hire additional employees without getting a clear signal from the market that economy is on the way to recovery and hence, meanwhile, they try to fill in different timeslots and/or duties with fewer human resources making employees' work schedule related flexibility/adaptability necessary. In the same vein, employers would prefer to have employees who can 'utilize technology' to reduce the cost of running the business during the economic downturn. To get work done when they need to get it done, employees are expected to have 'organizational skills,' that is, the ability to plan, organize, and prioritize work.

The employers considered 'motivation/initiative,' 'leadership skills,' and the ability to 'think analytically' more important during the Low Unemployment Period. Perhaps, during this time of economic expansion, employers are more likely to exploit new opportunities in the marketplace, which go beyond just scaling up their existing businesses and focus on adding new product-service bundles to attract new customer segments. This kind of proactive growth impetus/stance requires employees to be self-starters who take initiative and be motivated to explore new frontiers. Leadership skills and the ability to think analytically through every phase of these new initiatives are essential skills for employees to bring these initiatives to successful fruition.

Skills of high importance - The mean rating of employers' responses on skills that fell under the category 'Skills of high importance' were not as high as those of skills that fell under the category 'Skills of highest importance' or of those skills that fell under the category 'Skills of higher importance.' None of these skills (Skills of high importance) was rated 4.0 (out of 5) or higher in either the High Unemployment Period or the Low Unemployment Period. Additionally, the differences in means of employers' responses were not statistically significant between these two time periods (HUP and LUP). It would be incorrect to think of these skills as having low importance to the employers because of the mean ratings of these skills. Albeit lower than the skills in the other two categories, they were higher than the midpoint of the rating scale. Moreover, comments received from employers reflect this sentiment. Perhaps, the employers take it for granted that job candidates will have these skills. Thus, the skills that fell under the category 'Skills of high importance' are of importance to the employers and are expected during the High Unemployment Period as well as during the Low Unemployment Period. Figure 2 summarizes employers' skill preferences during HUP and LUP on a Venn diagram.

**Figure 2. Venn Diagram Showing Skill Preference During HUP and LUP**



In addition to asking prospective employers to rate the skills that are most important for entry level job candidates to possess, employers were asked about employment environments, hiring plans, intentions for future on-campus recruiting, methods used to recruit new college graduates, salary outlooks, minimum GPA requirement, internship opportunities, number of college years completed before considered for internship and so on. Employers’ responses regarding hiring plans and salary outlooks between two time periods (i.e., High Unemployment Period and Low Unemployment Period) are of particular interest and are shown in the tables below.

**Table 2. Hiring plans**

For the current year, your organization plans to (select one):

	HUP	LUP
Increase the number of new college hires	21%	46%
Maintain the number of new college hires	63%	51%
Decrease the number of new college hires	16%	3%

**Table 3. Salary outlooks**

For the current year graduates, your organization plans to (select one):

	HUP	LUP
Increase starting salaries	5%	24%
Maintain starting salaries	92%	76%
Decrease starting salaries	3%	0%

As shown in Table 2, the percentage of employers who planned to increase the number of new college hires more than doubled (46% versus 21%) during LUP compared to that of HUP. Moreover, as shown in Table 3, the percentage of employers who planned to increase starting salaries of the current year graduates increased almost five-fold (5% versus 24%) from HUP to LUP. The above two tables reflect local job market sentiment/outlook which mirrors the broader national job market environment during the two time periods (HUP and LUP) and provides some generalizability of the findings of the present study.

As a part of the survey, the prospective employers were also asked to provide qualitative feedback and their perspectives on the recruiting process and on applicants and their career preparation. This qualitative feedback may provide insights as to why employers thought certain skills were more important than others and their variations in ratings on those skills during the two time periods (HUP and LUP). Some common sentiment/themes emerged from comments made by the prospective employers during the two time periods. For example, several employers commented on the importance of communication skills in a number of ways. For brevity, rather than listing several similar comments, we present below only a few sample comments made by the employers.

A sample of comments made during both HUP and LUP:

- Our jobs require presenting project proposal at our customers' sites, so communication skills are crucial.
- Workload varies during different times of the year particularly when we 'Go Live' with marketing campaigns – good work ethic is essential.
- Work cells in our organization are team based and working in several teams is part of daily life. Team efforts are rewarded and recognized on a regular basis.
- Employees need to be able to relate their works with that of others', be good listeners to understand different viewpoints and be able to leave aside personality issues to get work done.
- Our company provides job related skills training, but we assume students know how to conduct professionally in a business setting. Career center at your university can provide professional development courses so they know how to act professionally before they enter the job market.
- Students need to articulate their thoughts clearly to the team members verbally and in writing.
- Corporate training programs are available to our employees on many technical skills they need to perform their jobs, but employees should have the urge and ability to learn. Internal candidates with proper skills are strongly considered for promotion.
- We get repeat business from our clients when they can trust us. Being honest with our coworkers and clients is valued in our company even when mistakes are made.
- Help students understand what it means to work in a professional business environment. They can still have fun but need to be professional about it – how they dress and how they interact with others.

A sample of comments made primarily during the High Unemployment Period (HUP):

- Customers are very cost conscientious these days and our employees will be trained to use technology to provide superior services cost effectively.
- New employees need to be flexible to fill in for different tasks as needed. We provide mentorship and job rotation.
- New recruit should be able to organize their routine tasks and carry on their day to day responsibilities without much supervision.
- You [new recruits] need to be flexible as some employees will be on call after hours and weekends on a rotating schedule.

A sample of comments made primarily during the Low Unemployment Period (LUP):

- We are expanding our business and new hires will grow with the company and will have the opportunity to take leadership roles right from the beginning.
- My company is looking for recent graduates with energy and drive to help us take our company to the next level.
- Our plan is to hire a large number of college graduates this year and candidates with analytical ability will thrive.
- We want a colleague who brings new ideas and initiatives to grow our business.

Prospective employers also made several comments during both the time periods (HUP and LUP) on topics that were not related to the survey questions. Certain concerns stood out related to students' inadequate knowledge about the company they were interviewing with, unrealistic expectations regarding job duties, career paths and salaries, and the need to lose the sense of entitlement. Although these topics were not the focus of this study, we believe that they are worth mentioning as these concerns were repeatedly voiced by the employers. University career services can play an active role in making students aware of these concerns so that they can improve their employability by rectifying these issues. Sample of comments are listed below:

- Tell students to research the hiring company before they show up for the interview.
- Give students a realistic expectation for their first job (type of jobs, initial pay, etc.)
- You [student] need to start at a lower-level position in order to learn the industry and position yourself to take on greater responsibility. Often students come to us wanting to start right away in a high-level management position. Knowledge and experience of the industry come first.
- Students need to understand realistic expectations and drop entitlement mentality.

## **DISCUSSION AND CONCLUSION**

The literature suggests that more often the skills recent graduates are missing are not technical skills but soft skills (Andreas, 2018). Moreover, most employers provide ample opportunity for newly hired recent graduates to be trained and fine-tuned in industry specific job skills. Soft skills, on the other hand, take time to nurture. One develops these skills through lived experience by interacting with others under different situations one confronts as one lives personal

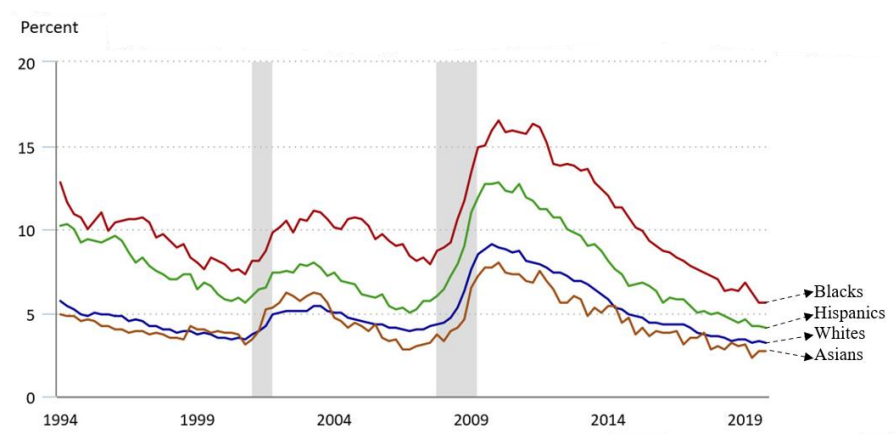


and professional lives. For this reason, students need to get started and continually improve on their soft skills before they enter the job market.

Often individuals are hired for their strong technical skills, but very soon they realize that they also need soft skills for upward mobility. Soft skills help one to understand organizational contexts, influence others, read other’s emotion and manage one’s emotions, negotiate, manage conflict, and develop professional networks. Wats and Wats (2009) assert that soft skills contribute significantly to one’s success in climbing successive management positions in corporate ladder. In other words, hard skills can help one get a job, but soft skills help one make advances through one’s career. Balcar (2016) argued that the usefulness and benefit of hard skills stem from their combination with soft skills. This is true even in companies where technical/hard skills are at the core of their competitiveness. For example, Google’s (Alphabet Inc.) People Analytics team conducted an internal study to understand what makes a good manager (study code name: Project Oxygen). They analyzed (using datamining and other statistical methods) feedback surveys, performance reviews, and nominations for top-manager awards and then they correlated words, phrases, complaints, and praises. The results of this study show that even at Google, technical skills rank behind the soft skills. More specifically, as Mr. Bock (Vice President for ‘People Operations’) stated as he reflected on the lesson learned from the study, “In the Google context, we’d always believed that to be a manager, particularly on the engineering side, you need to be as deep or deeper a technical expert than the people who work for you. It turns out that that’s absolutely the least important thing. It’s important, but pales in comparison. Much more important is just making the connection [with coworkers] and being accessible” (Bryant 2011, p. 1). Thus, the importance of soft skills in professional growth cannot be overemphasized and the core skill set (Skills of highest importance) identified in the present research provides a good starting point.

Historically, the unemployment rate has been much higher for black Americans. This segment of the population suffers the most in an economic downturn (see Figure 3). Moss and Tilly (1996) interviewed managers at 56 firms in four industries to understand the factors that contributed to black applicants’ low success in getting offers for entry-level jobs. The most important factor revealed by their investigation was that the black applicants lacked soft skills, according to these managers. Thus, not having the requisite soft skills is a great impediment to black American’s entry into the corporate world. This fact necessitates that black college students need to be made aware of this issue so that they can minimize their shortcomings and better prepare for the job market. Recognizing the disadvantages black Americans face, Hirsch (2017) suggested that steps should be taken to improve soft skills as early as when these students are at high schools and should continue when they are in colleges. Hirsch (2017) found that infusing important soft skills into courses, working with companies that offer internships, and using mock interviews improved employability for every student but particularly for black Americans who often lacked the desired soft skills.

**Figure 3. Unemployment rates (seasonally adjusted) by race and Hispanic or Latino ethnicity**



Note: Shaded areas represent recessions as determined by the National Bureau of Economic Research.  
Source: U. S. Bureau of Labor Statistics.

These days, many companies that previously required a college degree for professional positions are now relaxing that requirement for some positions. This is particularly true for IT/programming related jobs with corporations like Apple, Google, and IBM to name a few. These and many other companies offer internship programs or certification programs

focusing on specific skills. Someone interested in a career in these areas can apply to get enrolled in these company led apprenticeship and/or certification programs and are assured a job after successful completion of these programs. Someone can also obtain these technical skills by enrolling in coding bootcamps, online coding courses, or certification programs run by non-profit and for-profit organizations. IBM has one of the most organized apprenticeship programs (under its 'New Collar' initiative). The IBM Apprenticeship program provides opportunities for candidates without college degrees to build new technical skills while getting paid and is designed to create new career pathways. IBM emphasizes that an ideal candidate for the apprenticeship program should have a passion for technology and soft skills such as communication, teamwork, drive, creative problem-solving, etc. In other words, IBM is expecting apprenticeship candidates to bring these soft skills with them, and IBM will teach the technical skills. Moreover, IBM realizes that successful apprentices will need these soft skills after they complete the program to be successful in new career pathways they choose. Once again, the need for soft skills, even for someone who does not follow the traditional route to professional career, cannot be overemphasized. The finding of our study provides a core list of soft skills to develop and improve upon to start students' journey towards their new career pathways regardless of broader economic conditions.

Findings from this study can provide valuable inputs to prepare students for the job market conditions that they may face. Primary focus of academic institutions should be to at least provide students with opportunities and platforms to enhance their skills that fell under the category 'Skills of highest importance,' namely, Communication (verbal and written), Honesty/integrity, Interpersonal skills (relates well to others), Strong work ethic, and Teamwork skills (works well with others). These can serve as the core skill set upon which other skills can be added. Broader economic conditions can play an important role in the type of skills preferred by the employers and may contribute to skill mismatch for recent graduates lacking those preferred skills. Skill mismatch often leads to dissatisfaction with career options available and results into long-term earning loss (Liu et al., 2016) and, hence, deserves attention. Soft skills identified in the present study can help ameliorate the ill effects of skill mismatch as these soft skills help job candidates to cope better with their transition into allied jobs.

Students can enhance their soft skills in a number of ways while they are in college. These include taking active role in campus student chapters of professional associations and societies such as The American Accounting Association (AAA), the American Marketing Association (AMA), the Association for Supply Chain Management (ASCM), the Society for Human Resource Management (SHRM), and others. These organizations often bring professionals from industry to the chapter meetings, which helps students understand expectations from employers and creates opportunities for networking. Internships are an excellent way to learn about professional work environments. Many internship programs are designed to give students a 360 degree view of the organization by job rotation which in turn lets students hone both hard and soft skills. After completion of an internship, many universities require critical reflection on the internship experience by having the intern present in front of a class detailing both hard and soft skills learned. Most students work 10 to 20 hours to support themselves. This could be a source of gaining soft skills depending on the type of work involved. Some universities offer capstone projects to expose students to service-learning projects addressing community needs which allows students to enhance soft skills. Volunteering through non-profit organizations in the community also provides opportunity for improving soft skills.

Career and placement centers in a university can play a vital role in making students aware of the importance of soft skills, identifying their deficiencies, and helping them to improve by conducting mock interviews, creating job shadowing opportunity, holding job/internship fairs, and inviting successful alumni to share their experiences. These activities will help students realize job-related skills employers desire, as well as norms, values, and cultural expectations in business environments. Special attention needs to be paid to first generation college students who may not have a role model or mentor to follow and be oblivious to the importance of soft skills in their careers.

Over the years, researchers have attempted to identify job skills demanded by employers. Our study extends that stream of research by relating the demand of these skills in the context of broader economic conditions using the unemployment rate as a proxy and identifying the core skill set in the process. This core skill set may serve as the starting point and a base on which to build other soft skills. In our study, the local job market condition mirrored the broader national job market, thus, providing some generalizability of the findings of this research. Similar research needs to be conducted in different geographical locations to fully understand the skill needs nuances during High Unemployment Periods (HUP) and Low Unemployment Periods (LUP). Also, as mentioned earlier, unemployment rates differed significantly by race and ethnicity. Future research can focus on the role soft skills can play to narrow this gap.

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# Student Perceptions of Learning in Business Subject Areas After Completing an X-Culture Project

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## ABSTRACT

The X-Culture program provides students with the opportunity to work as part of a global virtual team to solution a real-world business challenge. Given the reliance of multinational organizations on virtual teams, it has become valuable, if not critical, for students to develop cultural intelligence, the soft skills and business discipline skills to work effectively across all business functions with a multicultural perspective. Increasing our understanding of the X-Culture learning outcomes for the business discipline areas and associated soft skills may contribute to the X-Culture program curriculum development and student success. This paper explores the perceptions of student participants in the X-Culture project on their learning outcomes across business disciplines, and soft skills areas such as global team leadership and collaboration. Our findings suggest that X-Culture students report learning in all the business disciplines, and soft skill areas, however the level of learning varies significantly across disciplines and skill areas. An exploratory analysis of the data suggests that the benefit of participating in X-Culture may vary by ethnic group.

**Keywords:** Experiential Business Learning, International Business, Virtual teams, Global teams, Self-directed teams, Cross-Cultural Skills, Cultural Competency, Soft Skills

## INTRODUCTION

Cross-cultural collaboration and experiential learning play critical roles in preparing students for success in the globalized business environment. The focus of this paper is on the X-Culture Project, a prominent international experiential learning initiative, offering students the opportunity to engage in virtual cross-cultural teamwork to solution a real-world business challenge. The project enables them to develop essential skills and competencies that are valued in the global marketplace. The following facts summarize the impact of X-Culture (<https://x-culture.org/for-professionals>).

- X-Culture launched: 2010.
- Number of students per session: 6,000
- Number of universities per session: 190
- Number of countries by student residence: 40
- Number of countries by student nationality: 75
- Total number of X-Culture graduates since 2010: 85,800
- Total number of universities since 2010: 371
- Total number of university professors since 2010: 908
- Notable clients: Mercedes-Benz, Louis Vuitton, Home Depot, Hard Rock International, JCB
- Number of clients per session: 10-15

## LITERATURE REVIEW

The literature review of Nachtigall, Shaffer and Rummel, 2022 found support for the positive motivational effects of higher education experiences that use authentic learning materials and resemble real-life experiences; a design modeled by X-Culture. Specific to the X-Culture program, several studies have focused on learning outcomes in areas including cross-cultural competence, communication skills, teamwork and collaboration, cultural awareness and sensitivity, academic performance, and professional development. The following sections provide insights from selected studies that explored specific educational benefits derived from X-Culture participation.

### **Cross-Cultural Competence**

Vas (2017) conducted a qualitative study exploring the experiential learning aspects of X-Culture in enhancing cross-cultural collaboration. The research emphasized the role of collaborative virtual projects in promoting cultural empathy, adaptability, and intercultural communication skills among participating students. Agndal and Nilsson (2020) investigated the impact of X-Culture on developing cultural intelligence in international business education. The study highlighted how the project facilitated cross-cultural collaboration, fostering students' abilities to navigate diverse cultural contexts and work effectively in global teams. Mohe, Vas, & Beinecke (2022) provided insights into the enhancement of cross-cultural competence through experiential learning in the X-Culture Project. The longitudinal study revealed significant improvements in participants' cultural awareness and sensitivity over time, attributing these gains to the immersive nature of collaborative cross-cultural assignments.

### **Communication Skills**

Beinecke and Mohe (2021) investigated the development of cross-cultural communication skills through virtual team projects in X-Culture. The study highlighted how participants learned to overcome language and cultural barriers, improving their abilities to convey ideas effectively and collaborate in multicultural settings. Sakamoto, Vas, & Levasseur (2019) explored the impact of X-Culture on fostering communication skills in international business education. Findings emphasized the importance of real-world collaborative experiences in enhancing students' communication strategies and cross-cultural negotiation abilities. Vas & Beinecke (2018) examined the enhancement of people skills in global virtual teams through the X-Culture Project. The study emphasized the role of digital communication tools and cultural sensitivity training in improving participants' virtual collaboration and interpersonal effectiveness.

### **Teamwork and Collaboration**

Levasseur & Sakamoto (2020) conducted a longitudinal study on developing teamwork and collaboration skills through X-Culture projects. Results highlighted participants' growth in team-building competencies and cross-cultural communication, showcasing the project's impact on preparing students for global teamwork. Mohe, Beinecke, & Vas (2021) investigated the enhancement of collaborative skills in international business education through lessons learned from the X-Culture Project. The study emphasized the development of adaptive teamwork strategies and intercultural problem-solving abilities among participants. Sakamoto, Vas, & Mohe (2017) examined the promotion of intercultural competence and collaboration in global virtual teams through the X-Culture Project. Findings emphasized the importance of structured team experiences in fostering cultural sensitivity and effective cross-cultural collaboration.

### **Cultural Awareness and Sensitivity**

Beinecke, Vas, & Levasseur (2020) explored the impact of X-Culture on enhancing cultural awareness and sensitivity through virtual collaborative projects. Results demonstrated participants' increased appreciation for cultural diversity and their ability to navigate cultural differences in global business contexts. Mohe & Sakamoto (2023) conducted a longitudinal study on developing cultural sensitivity in international business education using X-Culture participants. The research highlighted how immersive cross-cultural experiences contributed to participants' nuanced understanding of cultural nuances and global perspectives. Vas & Agndal (2019) investigated the impact of experiential learning on cultural intelligence through insights from the X-Culture Project. Findings underscored the project's role in enhancing participants' cultural adaptability, empathy, and communication effectiveness across cultural boundaries.

### **Academic Performance**

Beinecke & Mohe (2018) assessed academic performance in cross-cultural collaborative projects, providing evidence of the positive correlation between X-Culture participation and students' learning outcomes. The study emphasized how experiential learning through international projects enhanced students' engagement and academic success. Vas & Beinecke (2020) explored the relationship between X-Culture participation and student performance in international business education. Results demonstrated the project's contribution to enhancing students' cross-cultural competencies, which positively impacted their academic achievements.

### **Professional Development and Employability**

Baranova, Kobicheva and Tokareva (2021) investigated the enhancement of employability skills through experiential learning in the X-Culture Project. The study emphasized how online project-based cross-cultural experiences contributed to participants' emotional intelligence, enhancing their professional development and marketability. Vas & Sakamoto (2019) explored the building of global competencies and employability through virtual collaborative projects like X-Culture. Findings emphasized the project's role in developing participants' global mindset, networking abilities, and readiness for international job opportunities.

### Perceived Learning and Motivation

This study focused on student perceptions of learning as the measure for X-Culture learning outcomes. The researchers recognize that perceived learning is not actual learning, however the research supports strong linkages between learning and motivation to learn. Students who were initially not interested in pursuing a major who took a high school course in that subject area became more interested in pursuing that major in college (Yu, Kuncel, & Sackett, 2020). Knowledge gained may increase curiosity about a topic motivating student to seek a deeper understanding starting a feedback loop of subsequent learning (Murayama, FitzGibbon, & Sakaki, 2019). Ditta, Strickland-Hughes, Cheung & Wu (2020) found that exposure to information increased motivation to learn about the topic of that information. Ferreira, Cardosa, & Abrantes (2011) also found support that intrinsic motivation can enhance students' learning experiences. The studies support a positive relationship between perceived learning and intrinsic motivation.

### Literature Summary

This forementioned studies support the efficacy of the educational benefits of X-Culture participation, on cross-cultural competence, communication skills, teamwork abilities, cultural awareness, academic performance, and professional development among the student participants. However, no study to date has examined the perceived learning in the areas of marketing, management practices, supply chain, business technology, management structure, human resources, economics, business law, finance, accounting, and the soft skill factors. The understanding of learning in these areas is important for the implementation of X-Culture into the curriculum. For example, if X-Culture projects are not adequately providing students with an understanding in a particular area, then the instructor may want to supplement the program with additional materials, examples, and exercises. The findings may also be useful in determining which types of other subject area courses may benefit from X-Culture participation.

### X-Culture Emphasis on the Marketing Function

Table 1 is the X-Culture Grading Rubric. It is presented as it provides insights into the development of our hypotheses related to higher anticipated student learning in the Marketing discipline. Note that two sections of the Grading Rubric, Market Analysis and Marketing, are traditional areas of a comprehensive marketing plan. Additionally, sections of the Operations Management and Other section, Pricing and the distribution areas of partners, retailers, and distributors, are also elements of a comprehensive marketing plan. Given the relative emphasis on the marketing function in X-Culture projects, students have greater learning opportunities in Marketing compared to other business areas.

Table 1. X-Culture Grading Rubric	
<b>Executive Summary</b>	
<b>Market Analysis</b>	Industry/Competition Analysis
	New Market Analysis
<b>Marketing</b>	Promotion Channels
	Marketing Message
	Sample Brochure/Ad
<b>Operations Management and Other</b>	Pricing
	Entry mode, including suggested partners, retailers, distributors
	HR
	Logistics
	Trade regulations
	Certification
	Payments, funding, sponsorship, grants
<b>Presentation</b>	Arguments: Clarity, Strength
	Viability / Feasibility of the proposal
	Creativity/Novelty of ideas
	Formatting, presentation, readability

## HYPOTHESES

The hypotheses in this study were based on the literature and a review of the sample of X-Culture projects undertaken by the students at our institution over the past eight years. Most projects focused on international product or market development, although students were also challenged in other business areas. Projects tended to place less emphasis on the more structured and quantitative areas of business such as Accounting, Business Law, and Finance, possibly because of the regulatory complexity of these areas in global business endeavors. The rubrics used to score those X-Culture projects also tended to be more oriented toward marketing strategies and tactics.

H1a- Statistically significant perceived learning is expected in all business areas.

H1b- Perceived learning in the Marketing area is expected to be the greater than in other business areas.

H1c- Perceived learning in Finance, Accounting and Business Law business areas is expected to be lower than in other business areas.

As a validity check against past research, soft skill areas were examined including team collaboration skills, team leadership skills, project planning skills, organizational skills, international market research, international business skills and analytic skills. The following hypotheses were developed:

H2a- Statistically significant perceived learning is expected in all the soft skills areas.

H2b- Significant variation in perceived learning is expected in the soft skills areas.

H2c - Perceived learning is expected to be greatest in the following skills areas: team collaboration skills, team leadership skills and working with people from different backgrounds.

## METHODS

An anonymous online survey was conducted to collect data on the perceived learning in eleven (11) business disciplines, and eight (8) soft skill areas, associated demographic data were also collected. The sample size was eighty-eight students from four sections of an upper-level course in international business (titled Global Environment of Business at our institution) collected during two semesters. The instructors of the sections sampled in the study have broad professional and teaching backgrounds in business areas. The textbook and learning outcomes of the course cover all the business discipline areas.

The course is a requirement for all business majors. Students with majors in accounting, finance, management, information technology, and marketing departments take the course. The prerequisites for the course included completing introductory courses in accounting, finance, marketing, information technology, and organizational behavior. Most students take the Global Environment of Business course in their senior year, often after operations management and the capstone strategic management courses.

## FINDINGS

All analyses were performed with SPSS version 28. The survey items examined in this paper relate to potential perceived increases in learning associated with participating in X-Culture.

The following survey item was used to test the H1 hypotheses. *Please rate how much the X-Culture international collaboration has increased your knowledge in the following areas.* The zero to four (0-4) scale ranged from zero (0), “no learning at all” to four (4) “extensive learning.” “Moderate learning” was two on the scale.

H1a- Statistically significant perceived learning is expected in all business areas.

The business areas were presented to respondents in random order. The ordered means and standard deviations are in Table 2.

<b>BUSINESS AREA</b>	<b>MEAN</b>	<b>STD DEV</b>
Marketing	2.59	1.18
Cultural Factors of Business	2.55	1.13
Management Practices	2.24	1.17
Supply Chain	2.18	1.23
Business Technology	2.09	1.20
Management Structure	2.09	1.22
Human Resources	1.97	1.32
Economics	1.84	1.18
Business Law	1.77	1.26
Finance	1.74	1.27
Accounting	1.57	1.32

The results of a one-sample t-test using 1 (the value between moderate (2) and no learning at all (0)) indicated that every business area showed at least a minimal level of perceived learning at the  $P < .001$  level.

H1b- Perceived learning in the Marketing area is expected to be the greater than in other business areas.

A repeated measures ANOVA was performed to determine if there were differences among the business areas. See Table 3. (Pillai's Trace method is reported here. The results for Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root are identical.)

Effect	Method	Value	F	Hypothesis df	Error df	Sig.
Business Areas	Pillai's Trace	0.489	7.277b	10.000	76.000	<0.001

To adjust for the multiple comparisons, a Bonferroni correction was applied. Generally, mean differences of 0.40 or greater were statistically significant at the  $P < .05$  level. Results support that the perceived increase in learning in the marketing area was significantly greater than any other business area except for Cultural Factors in Business.

H1c- Perceived learning in Finance, Accounting and Business Law business areas are expected to be lower than in other business areas.

Referring to Table 2., perceived learning in Finance, Accounting and Business Law is significantly lower than in Marketing, Cultural Factors of Business, Management Practices and Supply Chain.

**Skills Areas:**

The following survey item was used to test the H2 hypotheses. *Please rate how the X-Culture international collaboration has increased your skills in the following areas.* The zero to four (0-4) scale ranged from zero (0), “no learning at all” to four (4) “extensive learning.” The business areas were presented to respondents in random order. The ordered means and standard deviations are in Table 4.

H2a- Statistically significant perceived learning is expected in all the soft skills areas.



The results of a one-sample t-test using 1 (the value between moderate (2) and no learning at all (0) indicated that each of the skills areas showed at least a minimal level of perceived learning at the  $P < .001$  level. See Table 4.

SKILLS AREA	MEAN	STD DEV
Working with people from different backgrounds	3.04	1.08
Team collaboration skills	2.92	1.12
Team leadership skills	2.84	1.13
Project planning skills	2.82	1.20
Organizational Skills	2.75	1.19
International market research	2.75	1.20
Interpersonal business skills	2.63	1.26
Analytic skills	2.46	1.19

H2b- Significant variation in perceived learning is expected in the soft skills areas.

A repeated measures ANOVA was performed to determine if there were differences among the skills areas. See Table 5. (Pillai's Trace method was reported here. The results for Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root are identical.)

Effect	Method	Value	F	Hypothesis df	Error df	Sig.
Business Areas	Pillai's Trace	.379	7.134	7.000	82.000	<.001

H2c - Perceived learning is expected to be greatest in the following skills areas: team collaboration skills, team leadership skills and working with people from different backgrounds.

To adjust for the multiple comparisons, a Bonferroni correction was applied. Generally, mean differences of 0.30 or greater were statistically significant. Perceived learning of team collaboration skills, team leadership skills and working with people from different backgrounds were significantly higher than reported learning of analytical skills.

#### Validity Check Conclusion

The results of this study indicate that participation in the X-Culture experience enhances perceived learning in business skills, a finding consistent with previous research discussed in the literature review. Hypothesis H2a was supported, confirming that all skill areas exhibited at least minimal statistically significant increases in perceived learning. Hypothesis H2b was also supported, revealing statistically significant differences between skill areas, with analytic skills showing lower perceived learning compared to 'soft' skills. Hypothesis H2c was largely supported, as the perceived learning in two key soft skill areas, working with people from diverse backgrounds and team collaboration, aligned with the findings of previous studies, such as Levasseur & Sakamoto (2020) and Beinecke & Mohe (2021).

#### Post-Hoc Analyses

A post-hoc analysis revealed no statistically significant differences between males and females on Perceived Learning in the either the functional business or the soft skill areas.

However, there were differences in learning perceptions based on the race/ethnicity reported by the respondents. Only two groups, Caucasian and Hispanic, were examined given limitations in our sample size). For ten (10) of the eleven (11) business areas, students who identified as Hispanic had a mean rating of perceived learning that was greater than students identified as Caucasian. The z-value is 2.7136. The p-value is .007. See Table 6.

<b>Table 6: Race/Ethnicity Variations in Perceived Learning by Business Discipline</b>				
<b>Business Area</b>	<b>Race/Ethnicity</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Marketing	Hispanic	27	2.78	1.22
	Caucasian	50	2.62	1.10
Finance	Hispanic	27	2.07	1.33
	Caucasian	49	1.57	1.22
Accounting	Hispanic	27	2.00	1.33
	Caucasian	50	1.40	1.26
Supply Chain	Hispanic	27	2.26	1.23
	Caucasian	50	2.22	1.20
Business Technology	Hispanic	27	2.41	1.22
	Caucasian	50	2.00	1.18
Economics	Hispanic	27	2.00	1.21
	Caucasian	50	1.82	1.19
Management Structure	Hispanic	27	2.33	1.18
	Caucasian	50	2.04	1.19
Management Practices	Hispanic	27	2.44	1.12
	Caucasian	50	2.22	1.13
Human Resource	Hispanic	27	2.26	1.20
	Caucasian	50	1.82	1.32
Business Law	Hispanic	27	1.78	1.28
	Caucasian	49	1.82	1.27
Cultural Factors	Hispanic	27	2.63	1.24
	Caucasian	50	2.60	0.99

Potential differences in perceived learning in soft skill areas by ethnic group were also examined. For six (6) of the eight (8) skills areas, students identifying as Hispanic reported more learning. The two areas that they reported less learning were in analytic skills and international market research skills.

**Table 7: Race/Ethnicity Variations in Perceived Learning by Skills Area**

Skills Area	Race / Ethnicity	N	Mean	Std. Deviation
Working with people from different backgrounds	Hispanic	27	3.15	0.86
	Caucasian	51	3.10	1.04
Team leadership skills	Hispanic	27	3.07	0.92
	Caucasian	51	2.84	1.12
Team collaboration skills	Hispanic	27	3.07	0.87
	Caucasian	51	2.90	1.17
Organizational Skills	Hispanic	27	2.89	1.05
	Caucasian	51	2.73	1.22
Analytic skills	Hispanic	27	2.44	1.12
	Caucasian	51	2.49	1.14
Project planning skills	Hispanic	27	3.07	0.96
	Caucasian	51	2.76	1.27
Interpersonal business skills	Hispanic	27	2.93	0.96
	Caucasian	51	2.57	1.27
International market research	Hispanic	27	2.59	1.15
	Caucasian	51	2.92	1.11

Lastly, we conducted an analysis of the overall student evaluations of the X-Culture experience with three (3) questions. For two (2) of the items in the overall evaluation questions, the differences between the groups were statistically significant. (See table 8). For the remaining question, Hispanic student evaluations were closer to Caucasian students, however in all cases they rated their experience higher than their Caucasian peers.

**Table 8: Race/Ethnicity Overall Evaluations of X-Culture Experience**

Overall Evaluations	Race / Ethnicity	N	Mean	Std. Deviation
To what extent has X-Culture prepared you for future work on cross-cultural teams. (1-5 Scale 1-not at all; 5 substantial)	Hispanic	27	3.89	0.89
	Caucasian	51	3.73	1.04
To what extent is X-Culture a beneficial educational program for students. * (1-5 Scale 1-not at all; 5 substantial)	Hispanic	27	4.15*	0.82
	Caucasian	51	3.55	1.21
How likely is it that you would recommend X-Culture to a friend or colleague. * (0 not at all likely; 10 extremely likely)	Hispanic	26	7.42*	2.18
	Caucasian	51	5.84	2.89

\* Independent sample t-test significant at the .05 level.

**DISCUSSION**

The two major hypotheses of the study were supported. Students reported learning after engaging in the X-Culture project in both business discipline areas and soft skills areas. There were variations in the level of learning across both

the business discipline areas and the soft skills areas. Post-hoc analysis pointed to the need to examine potential group differences, that is, do certain groups of students benefit more from participating in the X-Culture program?

The findings of this study support that implementation of the X-Culture program increases learning in the business disciplines and associated soft skills areas. Significant perceived learning was reported for all the business disciplines. However, there were differences among the business discipline areas. Students rated a higher level of learning in marketing than in every other business area. As previously mentioned, the X-Culture program is part of a required international business course at our institution. Given that students reported learning so widely across business disciplines, there may be value in utilizing the X-Culture program in other courses such as strategic management, international marketing, or global supply chain and logistics. Moreover, if X-Culture is part of general international business course, instructors may want to supplement the project with additional materials in the business disciplines where weaker perceived learning was reported. Learning in all the surveyed soft skills areas was found; there were however variations in the reported level of learning. Not surprisingly, students rated their learning in analytic skills to be lower than in other soft skills areas. As discussed in the Findings section, these results align with the X-Culture program literature.

The post-hoc findings indicate the group of students who self-identified as Hispanic reported a higher level of learning than the group of students who identified as Caucasian in several business disciplines and skill areas. Understanding the reasons for this presents an interesting potential direction for future research. Castellanos & Gloria (2007) may provide insights, the group dynamics nature of the X-Culture project may be compatible with how Hispanic students learn best:

*“Finally, fostering activities that encourage students to create different family like roles for themselves and others lends credence to infusing family within education. That is, group study sessions, research teams, or cohort activities prompt connection with peers who affirm their experiences.”* (Castellanos & Gloria, 2007),

Furthermore, students who self-identified as Hispanic seemed to get more overall benefit from the X-Culture program and reported they were more likely to recommend the X-Culture project to a friend.

## LIMITATIONS

The limitations of this study are the small sample, and the use of perceived student learning as the measurement rather than actual learning. Student respondents for this research were primarily seniors who had completed the majority of their required business courses. Implementing the X-Culture program into a lower-level course in the business curriculum might yield different findings. In addition, a different overall student population may have yielded different results. The student population for this research was from a Hispanic Serving Institution (HSI) and as the post-hoc analysis indicated, this group may have greater perceived benefits from a team-based project, like X-Culture.

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# Assessing the Impact of Software As A Service (SaaS) Innovations on Disrupting the Enterprise Software Industry

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## ABSTRACT

A primary factor in the recent growth in the enterprise software industry is software-as-a-service, commonly known by its acronym - SaaS. The key drivers of this growth are several technology and business innovations working in concert. In this paper, we extend prior research regarding disruptive innovation with a specific focus on the enterprise software industry. We discuss how acquisition and deployment of SaaS by enterprises is different than on-premises software sold as a product; related technology infrastructure and licensing of SaaS; and accounting and finance metrics for assessing and valuing SaaS companies that complement GAAP standards and principles. The paper will be useful to professors and students in course discussions regarding innovation and, more broadly, technology.

**Keywords:** disruptive innovation, software industry practices, SaaS, entrepreneurial finance

## INTRODUCTION

Software is an integral part of our personal lives, business activities, and government services. The majority of the ten largest publicly-traded companies by market cap are either software companies or businesses where software is integral to their operations and products. Heading the list is Apple and Microsoft, each at over \$3 trillion in market cap as of the time of our research and writing. Many of the top fifty companies by market cap are either software companies or enabled by software technologies; for example, Oracle is valued at over \$383 billion, SAP at over \$249 billion, and Netflix at over \$270 billion.

Revenues in the software industry are estimated to be approximately \$700 billion dollars in 2024 and are expected to grow by over 5 percent annually going forward (Statista, 2024). By way of contrast, total revenues for all US Colleges and Universities in 2023 was under \$560 billion and given trends from 2018 through 2023 is likely to decline in 2024 (IBIS World, 2024). We can only expect, moreover, that software will continue to grow more important in our lives with the greater use of artificial intelligence, crypto, and more powerful applications, for example, personalized medicine.

## SAAS

A primary factor in the growth in the enterprise software industry is software-as-a-service, commonly known as SaaS. During the past several years software companies and their customers – enterprises and governments have dramatically shifted to SaaS as the primary way to access and use software. An important driver of this shift and, accordingly, a key factor in the growth of the software industry, is several technology and business innovations enabled by SaaS (Cusumano, 2010; Miranda, 2015). These innovations have enabled significant increases in the number of software companies, a faster pace in the functionality of software and an increase in the types of software applications available to individuals, enterprises, and government agencies (Ansley, 2018).

## EXTENDING EXISTING RESEARCH ON DISRUPTIVE INNOVATION AND SPECIFICALLY SAAS

Researchers have been interested in the diffusion of innovation for decades (Rogers, 1995). More recently, the impact of disruptive innovations has been a focus for many researchers in business schools and at corporations. One of the earliest published work on disruptive innovation focused on how disruptive technologies as compared to incremental technologies could change the marketplace “playing field” in an industry (Christensen and Bower, 1996).

Several researchers have expanded on that earlier research. The literature includes many articles that analyze disruptive innovation from the perspective of startup firms, incumbents, and in a variety of industries. Several papers

have been published that discuss inconsistencies between the theory of disruptive innovation and practice (Si and Chen, 2020; King and Baartartogtokn, 2015). The rapid growth in research and publications focused on disruptive innovations led the authors of one paper to note that “disruption innovation” had largely become a business buzzword (Nagy, et al., 2016), a criticism that many of us may need to be aware of when covering the topic of innovation in our courses.

Many researchers have focused on innovation in the software industry and strategies related to disruption (Bandulet, 2016; Katenecker, 2015). Other researchers have published articles covered broader issues related to SaaS, including cloud computing, Infrastructure as a Service “IaaS” and Platform as a Service “PaaS” (Mell and Grace, 2001).

The article builds on the prior research regarding disruptive innovation in general and specifically within the enterprise software industry. Drawing on the prior research and our experience in the field we analyze the impact of SaaS on innovation disruption in the enterprise software industry and the primary causes, business and technological driving the disruptions. Our work complements and extends the prior research by discussing how specific technology and business innovations in concert have driven the disruption including, but not limited to, the processes for acquiring and deploying SaaS software; the cloud infrastructure that has enabled SaaS, IaaS and PaaS; and accounting and finance metrics for assessing and valuing SaaS companies.

The article will be of value in courses covering innovation, the software industry, and in furthering student understanding about how SaaS companies and, more broadly, subscription businesses may be assessed and valued with financial metrics that complement GAAP standards and principles.

The paper is divided into three-related sections:

First, we provide an overview of the software industry, including a discussion of licensing and deployment. We cover the different ways that software has been sold and the migration to SaaS as the primary way to use software by enterprises and government agencies, as well as consumers.

Second, we review key innovations in SaaS that together have enabled the disruption from traditional licensing and provisioning of software by enterprises and government agencies. We discuss the impact of IaaS and SaaS leveraging cloud technologies to disrupt the software industry and cover several key innovations in SaaS that benefit enterprises and software companies (Mantz, 2023; Kursh and Schnure, 2015; Bhardwaj, Jain and Jain, 2010). In the last part of the section we discuss how SaaS has led to innovations in financial metrics that complement GAAP standards and principles for assessing and valuing SaaS companies.

Third, we provide conclusions and thoughts regarding what could be next regarding innovations in the software industry.

## **THE SOFTWARE INDUSTRY**

Software is a generic term used to describe instructions known as computer programs that enable computer hardware, whether desktop, network, or mobile, to provide functionality. The software industry is comprised of companies that develop and provide software to individuals, enterprises, and governments. Additionally, many individuals, enterprises, and government agencies develop their own software for specific tasks. By way of example, those of us who create macros in Excel are writing software programs. Many enterprises also develop their own software, particularly in industries, like financial services and life sciences, where unique functionality is required, often through trade secrets and proprietary and confidential information in the software code, that provides a competitive advantage.

There are four primary categories of software:

1. Operating system – An operating system, like Microsoft Windows or Linux, is the core set of software on a device that keeps everything together. Operating systems communicate with the device’s hardware. Operating systems handle everything from your keyboard and mice to the storage devices, and the display. The Apple iPhone’s operating system is iOS; Android OS is a Linux-based operating system. It is used with Samsung, Google, and most other mobile devices other than Apple iPhones.

2. Application software – Application software is designed to sit on top of the operating system and perform a suite of functions, tasks, or activities for the end user. It includes the graphic user interface (GUI) that the user interacts with to control the computer. Programs such as Microsoft Word, an accounting program like Quicken, or video games, an industry larger than the movie or music industries (Arora, 2023), are examples of applications. There are numerous types of applications such as desktop applications for personal computers; web applications that are programs that run over the Internet; and mobile applications that run on smartphones and tablets.
3. Utility applications – Utility programs are meant to help system administrators and computer programmers maintain and service their computer networks. Cybersecurity software falls within this category and it is a rapidly growing vertical software market, as evidenced by the publicity after the recent July 2024 incident involving CrowdStrike that caused havoc in the airline industry and other industries.
4. System software – System software controls and directs certain functions of the hardware. Examples of system software include Boot programs, Embedded programs, and Microcode programs. All of these programs are installed as part of the computer hardware manufacturing process. An example of an embedded program is the software on a cable television box or router that provides internet access.

### **The Licensing and Provisioning of Software**

Presently, there are two prevalent methods for how software is provided, what is called provisioned, for use.

The first method is “software as a product,” which is when an enterprise, individual, or government agency purchases a license from the software company for rights to use the software. Typically, the software is provisioned and on the licensee’s computer hardware or at a third-party site where the licensee controls the software and hardware. An example would be a software program that you would purchase and install on your computer for your sole use. Similarly, an enterprise could purchase a software product like an Oracle database, ERP (enterprise resource planning) software, or a vertical-market product, for example, electronic medical records management at a hospital or medical practice for its use on servers at its facilities or located at a third-party site.

The license fee, *i.e.*, the price of product, per software industry customs and practices, is based on metrics and scope of use determined by the software company (*e.g.*, number of seats, geographic region, period of time to use the software, simultaneous users, *etc.*). Individuals and SMB (small and medium-sized businesses) purchasing software typically cannot negotiate terms relating to the metrics. By contrast, the metrics and scope of use are often negotiated by software companies with enterprises and government agencies as part of the licensing process. The “purchase” of the license by the enterprise or government agency is typically done through a click-through agreement if the software is purchased online and/or via a formal document that is executed by the software company, the licensor, and the licensee, (*i.e.*, the enterprise or government agency.)

There are also typically reoccurring costs for software support and updates with software as a product that is provisioned for on-premises installations. These recurring costs are usually negotiated by enterprises and government agencies. Enterprises and governments often negotiate terms regarding the type and level of the bugs and the response times by the software company to fix the bugs. As with the license fees associated with purchasing the software product, individuals SMB rarely have negotiating leverage with software companies regarding these reoccurring costs.

Critically with software as a product, the licensee has to account for additional costs such as hardware, IT labor, physical space, as well as other expenses. The elimination or significant reduction of these infrastructure and transaction-related expenditures is a significant driver for demand for SaaS, a topic we discuss below.

Software as a product was once the primary way that software was provisioned to enterprises, governments, and individuals. The only real exception was software embedded in hardware that was sold to end users, for example, calculators and medical devices.

The second method, which is the focus of this paper is SaaS, which is when an enterprise or government agency purchases the rights to use the software and accesses the software via a computer, tablet and/or mobile phone. (Consumers do the same, but consumer software, except in setting context, is not a subject in this paper.) At a high level the purchase of usage rights is not significantly different than with the purchase of usage rights with the software as a product sale, the traditional provisioning method (Amazon Web Services, 2024).



The pricing for SaaS application software typically takes the form of a reoccurring fee, hence, the term “subscriber” for users. The fee for enterprises and governments is based on a metric (*e.g.*, users, numbers of sites, location of sites, scope, functionality, *etc.*) For individuals and SMB the fees are usually not negotiable and the subscriber’s rights to use and scope of use are limited.

Despite the use of the term “subscribers,” the enterprises and governments also have licenses as with software as a product provisioned on premises. The major difference is that the user rights are limited to access and are terminated once the subscription is no longer paid. These are called Access Licensees – *i.e.*, the user has access to a SaaS product until the subscription is terminated, at which point the vendor (or licensor) prohibits further access absent renewal.

### **Shift from On Premise to SaaS**

Although enterprises have used computers as early as about seventy-five years ago, the development and use of SaaS for enterprises largely began in the late 1990s with NetSuite, an accounting and financial management SaaS targeting SMB, and Salesforce’s CRM (customer relationship management). With the dotcom crash in the year 2000 along with other factors it took several years for SaaS to become readily acceptable as an alternative to on-premises deployment of applications by most enterprises, individuals, and governments.

SaaS is now the primary method for selling rights to use software (Datanami, 2024). Most major software companies, for example, SAP, no longer license software only for on premise installations and now offer SaaS (Lin, 2024). Many of these software companies still provide support and maintenance for existing on premise licensees due to some licensees preferring not to make the switch to SaaS due to among other factors, financial reasons, inertia, security, and regulatory factors. Some software companies, for example, Oracle, Adobe, and Citrix, have taken a more aggressive posture and have sought to force licensees to switch to SaaS, often because investors prefer the income streams from SaaS compared with the income streams with software sold as a product. Many software companies license software for both on-premises deployment and SaaS due to demands by their targeted customer groups.

IDC, a leading IT-research company, forecasts that public cloud spending by enterprises (*i.e.*, spending for SaaS and ASP (application service provider; Aiken et al, 2002) accounted for over 70 percent of the market as of 2024. IDC also forecasts that SaaS will grow at about a 50 percent higher rate than software for on-premises deployment in the immediate future (Ascendix Technologies, 2024). Another leading research organization, Gartner, found similar growth numbers for SaaS. More specifically, Gartner forecasts that SaaS will grow by 20 percent in 2024 and 19.4 percent in 2025 (Datanami, 2024).

Looking at SaaS data from the perspective of enterprises, the number of SaaS applications being used by enterprises now accounts for 70 percent of software use by those enterprises. The number of SaaS applications an enterprise uses on average has grown from eight in 2015 to 130 in 2022 (Ascendix Technologies, 2024).

One of the ways that SaaS has disrupted the software industry is by enabling many software companies to target relatively small vertical market opportunities, the classic “long-tail.” Indeed, there are literally over one thousand known SaaS applications (Finances Online, 2024).

Clearly, there are a wide and deep range of categories of SaaS products available to enterprises and government agencies, particularly compared to licensed software as a product options. This is likely due to the economics of SaaS enabling the creation of SaaS companies that sell subscriptions designed for specific vertical-market niches. Based on our experience this wide and deep range of categories far exceeds what was ever available with on-premises deployment software.

### **SAAS HAS DISRUPTED THE SOFTWARE INDUSTRY**

Obviously, no one single factor explains why SaaS has disrupted the software industry. Many researchers have discussed how most disruptions in industries occur due to multiple factors (Ridley, 2017; McGrath, 2019; Satell, 2017). These innovations are typically interrelated and often encompass technology, economics, business design (*i.e.*, models) and other factors.

## Technology

The major technology innovation that enabled SaaS is the cloud and specifically Infrastructure as a Service (Mantz, 2023). The key difference between SaaS and traditional on-premises deployment with software is that SaaS applications are designed to be hosted on the cloud by the software vendors versus at the enterprises' facilities. A SaaS vendor can host its application(s) with cloud service providers like Microsoft's Azure, Amazon's AWS, IBM Cloud, Google Cloud, Rackspace, or other hosting services. Alternatively, a SaaS vendor can host its application(s) on its own cloud, which we have seen particularly prominent in vertical markets where security, regulatory, and unique business factors may be relevant. Some cloud services vendors, for example, IBM, offer a hybrid cloud option (a combination of a public cloud and private cloud) in response to these needs from enterprises and governments.

SaaS provides several technology-related advantages that result in significant business advantages as compared with on-premises deployment. One set of important cost advantages is that an enterprise does not need to invest in large upfront costs for hardware, networking, and other critical infrastructure, including even physical facilities, thus, reducing the TCO (total cost of ownership).

Another cost benefit with SaaS is that enterprises using the software don't need to have as many technical and support staff compared with on-premises deployment. Consider alone the cost savings that favor SaaS such as no hassles with data backup, not having to install and test upgrades and patches, and, critically important for most enterprises, security and data protection.

In fact, one research firm found that TCO with SaaS could be reduced by over 70 percent as compared with on-premises deployments. Even if this finding of an over 70 percent reduction is off by half, a cut in TCO by 35 percent is significant, particularly in today's environment where IT management are continually asked to do more with less (Datanami, 2024).

Additionally, from the perspective of an enterprise facing peak demand for its software, say, for example, a retailer that needs to process transactions at peak periods such as the holiday shopping season, that SaaS combined with IaaS provides elasticity. In other words, the software capability can quickly scale with increases in demand during peak periods and with growth in subscribers overall.

This elasticity enables scale. It significantly decreases the investment costs for subscribers since there is no need to acquire expensive hardware with the capability of handling future growth demand needs. It also reduces, importantly, transaction costs. When demand peaks happen the software scales immediately.

Another benefit is that the software company doesn't need to pay for all of the cloud infrastructure it needs just for peak period demands, *i.e.* like renting versus owning. By way of example, think about when someone moves and hires a company with large trucks and crews to do the move. Once the move is completed the consumer no longer needs to pay for the moving truck and crew.

The technology benefit of SaaS is that a user at an enterprise, assuming s/he has rights to use the SaaS application, may access the application from a web browser. This includes not just desktop computers, but also mobile devices, *i.e.*, phones and tablets.

In effect, user interfaces (UI) and, more broadly, user experiences (UX) with SaaS facilitates training time of personnel. Almost all of us are comfortable with using SaaS applications like Gmail, Quicken, and apps on our mobile devices. These personal experiences enable most of us to learn and adopt SaaS applications relatively easily and certainly faster than what many people did in the past with most on-premises software sold as a product. From the perspective of an IT manager and C-level personnel, this ease of use and faster learning period often resulting in faster implementations further provides support for going with SaaS applications, even if the available SaaS applications are not as customizable or flexible as on-premises deployed software.

Another critical difference between SaaS as compared to on-premises software is that SaaS leverages a multi-tenant architecture which allows multiple organizations to access the same application or what is called an "instance." In other words, although the software application is the same among all of the subscribing enterprises, enterprise-specific configuration, data and security is isolated between enterprises subscribers (Miranda, 2015). A similar paradigm applies with consumer SaaS applications like Google's Gmail.

The multi-tenant architecture makes development and support of the software by the software company much easier and more efficient as compared with traditional on-premises deployment or ASP (application service provider solutions ([Microsoft, 2024]). This is particularly relevant for enterprises and government customers. Putting aside subscriber training and general on boarding issues, a SaaS solution can get up and running and provide near-immediate returns to enterprise subscribers as compared with on-premise software which has a much longer implementation period.

In our experience the faster positive returns help to create success stories and build credibility among an enterprise's users. Just as someone can quickly setup a Gmail address and most other SaaS software products for individual use as compared with what was done in the past with traditional software loaded on the user's hardware, an enterprise can get up and running relatively quickly with a SaaS application. This enables an overall positive experience that builds momentum and enhances the software company's credibility.

Additionally, SaaS enables much a faster and easier process for rolling out new features and fixing software bugs. In contrast to software running on premises, a SaaS company monitors the real-time use of its software, detects and resolves issues, and make incremental changes that can be easily assimilated by subscribers. In turn, the SaaS becomes more "locked in" with many subscribers. More importantly, by controlling the upgrades SaaS companies can innovate continually, creating a faster and more efficient innovation cycle.

Another benefit, referenced above, provided by SaaS is better security. Although each of us should have security software installed and operational on our computers and other devices, security-related risks are lower with software that runs in the cloud at vendors like AWS, Microsoft Azure, Google Cloud and others as compared with an organization obtaining, installing, and updating security software on its own hardware. (The recent incident with CrowdStrike was internal, *i.e.*, a bug in the CrowdStrike software, not from external malware or bad actors.)

The reality is that no software application can be entirely free of security risks, but having a SaaS application is less risky than if the software runs on premises (Kursh and Patel, 2022). It is also more economical for SaaS application providers to utilize security solutions offered by their IaaS provider instead of trying to do it themselves which allows them to concentrate on building and running software applications.

In sum, SaaS came about with the internet and through a series of technology and business innovations (discussed below) has effectively replaced traditional, on-premises software for most users, whether, enterprises, government or individuals. The technology innovations have enabled software companies to provide a superior product to users at a lower cost, with lower risk, better features and better performance.

The major technology innovation that enabled SaaS is the cloud and specifically Infrastructure as a Service (Mantz, 2023). The key difference between SaaS and traditional on-premises deployment with software is that SaaS applications are designed to be hosted on the cloud by the software vendors versus at the enterprises' facilities. A SaaS vendor can host its application(s) with cloud service providers like Microsoft's Azure, Amazon's AWS, IBM Cloud, Google Cloud, Rackspace, or other hosting services. Alternatively, a SaaS vendor can host its application(s) on its own cloud, which we have seen particularly prominent in vertical markets where security, regulatory, and unique business factors may be relevant. Some cloud services vendors, for example, IBM, offer a hybrid cloud option (a combination of a public cloud and private cloud) in response to these needs from enterprises and governments.

SaaS provides several technology-related advantages that result in significant business advantages as compared with on-premises deployment. One set of important cost advantages is that an enterprise does not need to invest in large upfront costs for hardware, networking, and other critical infrastructure, including even physical facilities, thus, reducing the TCO (total cost of ownership).

Another cost benefit with SaaS is that enterprises using the software don't need to have as many technical and support staff compared with on-premises deployment. Consider alone the cost savings that favor SaaS such as no hassles with data backup, not having to install and test upgrades and patches, and, critically important for most enterprises, security and data protection.

In fact, one research firm found that TCO with SaaS could be reduced by over 70 percent as compared with on-premises deployments. Even if this finding of an over 70 percent reduction is off by half, a cut in TCO by 35 percent is significant, particularly in today's environment where IT management are continually asked to do more with less (Datanami, 2024).

Additionally, from the perspective of an enterprise facing peak demand for its software, say, for example, a retailer that needs to process transactions at peak periods such as the holiday shopping season, that SaaS combined with IaaS provides elasticity. In other words, the software capability can quickly scale with increases in demand during peak periods and with growth in subscribers overall.

This elasticity enables scale. It significantly decreases the investment costs for subscribers since there is no need to acquire expensive hardware with the capability of handling future growth demand needs. It also reduces, importantly, transaction costs. When demand peaks happen the software scales immediately.

Another benefit is that the software company doesn't need to pay for all of the cloud infrastructure it needs just for peak period demands, *i.e.* like renting versus owning. By way of example, think about when someone moves and hires a company with large trucks and crews to do the move. Once the move is completed the consumer no longer needs to pay for the moving truck and crew.

The technology benefit of SaaS is that a user at an enterprise, assuming s/he has rights to use the SaaS application, may access the application from a web browser. This includes not just desktop computers, but also mobile devices, *i.e.*, phones and tablets.

In effect, user interfaces (UI) and, more broadly, user experiences (UX) with SaaS facilitates training time of personnel. Almost all of us are comfortable with using SaaS applications like Gmail, Quicken, and apps on our mobile devices. These personal experiences enable most of us to learn and adopt SaaS applications relatively easily and certainly faster than what many people did in the past with most on-premises software sold as a product. From the perspective of an IT manager and C-level personnel, this ease of use and faster learning period often resulting in faster implementations further provides support for going with SaaS applications, even if the available SaaS applications are not as customizable or flexible as on-premises deployed software.

Another critical difference between SaaS as compared to on-premises software is that SaaS leverages a multi-tenant architecture which allows multiple organizations to access the same application or what is called an "instance." In other words, although the software application is the same among all of the subscribing enterprises, enterprise-specific configuration, data and security is isolated between enterprises subscribers (Miranda, 2015). A similar paradigm applies with consumer SaaS applications like Google's Gmail.

The multi-tenant architecture makes development and support of the software by the software company much easier and more efficient as compared with traditional on-premises deployment or ASP (application service provider solutions ([Microsoft, 2024]). This is particularly relevant for enterprises and government customers. Putting aside subscriber training and general on boarding issues, a SaaS solution can get up and running and provide near-immediate returns to enterprise subscribers as compared with on-premise software which has a much longer implementation period.

In our experience the faster positive returns help to create success stories and build credibility among an enterprise's users. Just as someone can quickly setup a Gmail address and most other SaaS software products for individual use as compared with what was done in the past with traditional software loaded on the user's hardware, an enterprise can get up and running relatively quickly with a SaaS application. This enables an overall positive experience that builds momentum and enhances the software company's credibility.

Additionally, SaaS enables much a faster and easier process for rolling out new features and fixing software bugs. In contrast to software running on premises, a SaaS company monitors the real-time use of its software, detects and resolves issues, and make incremental changes that can be easily assimilated by subscribers. In turn, the SaaS becomes more "locked in" with many subscribers. More importantly, by controlling the upgrades SaaS companies can innovate continually, creating a faster and more efficient innovation cycle.

Another benefit, referenced above, provided by SaaS is better security. Although each of us should have security software installed and operational on our computers and other devices, security-related risks are lower with software that runs in the cloud at vendors like AWS, Microsoft Azure, Google Cloud and others as compared with an organization obtaining, installing, and updating security software on its own hardware. (The recent incident with CrowdStrike was internal, *i.e.*, a bug in the CrowdStrike software, not from external malware or bad actors.)

The reality is that no software application can be entirely free of security risks, but having a SaaS application is less risky than if the software runs on premises (Kursh and Patel, 2022). It is also more economical for SaaS application providers to utilize security solutions offered by their IaaS provider instead of trying to do it themselves which allows them to concentrate on building and running software applications.

In sum, SaaS came about with the internet and through a series of technology and business innovations (discussed below) has effectively replaced traditional, on-premises software for most users, whether, enterprises, government or individuals. The technology innovations have enabled software companies to provide a superior product to users at a lower cost, with lower risk, better features and better performance.

### **Economics and Business Models**

Another category of innovations that has powered SaaS to disrupt the software industry relates to economics and business models. We will now discuss SaaS innovations in regards to subscribers and then buyers.

#### **SaaS for Subscribers**

Consider first the perspective of enterprises and government agencies – *i.e.*, the subscribers. The fact that subscription payments are on a “pay-as-you go” basis versus software sold as a product and deployed on premises where the licensee pays for rights, often without a limitation to length of time of use. Hence, and this is critical from the perspective of reducing the risk of purchase of SaaS software, there is much less risk given the lower initial financial investment, for the subscriber if the software fails.

Similarly, should the subscriber’s needs change due to business factors, concerns about the software, macroeconomics or any other reason, the subscriber can simply cancel the relationship. The amount of money invested in the no-longer-needed SaaS software is much less than as compared with traditional deployment because it is much easier to turn it off and end the relationship with the vendor.

The combination of ease of access, lower costs, scalability, and managed infrastructure makes SaaS a more attractive option for businesses to experiment with new software solutions without significant upfront investments or in-house technical expertise. Hence, if a SaaS application doesn’t work as expected, an enterprise can cancel its subscription and move in a different direction with another vendor.

On-premises software licensed as a product is different – it requires greater financial, personnel, and investments along with greater risks of failure (Fruhlinger, 2022). In contrast to the economic adage that one should never make a decision on sunk costs, in our experience enterprises and government agencies are hesitant to accept their losses with a failed software (purchased as a product) implementation project. These losses include not just financial losses, but losses in time spent by personnel with the failed implementation; hardware and infrastructure not needed and declining in value due to technology obsolescence factors; reputation downsides, particularly if the software is part of an overall restructuring; and the risks associated with acquiring a different software product.

The total financial, time, and reputation investments made, even including customization work and staff training, is much lower with SaaS as compared to on-premises deployment (Amazon Web Services, 2024). Plus, the faster implementation time creates opportunities for small successes with immediate positive financial returns, a critical factor in ensuring overall acceptance of the software among users at enterprises.

Another economic factor that benefits SaaS for enterprises is how the software acquisition is handled for accounting and tax-reporting purposes. Unlike deployments of software as a product where enterprises usually have to capitalize the investment in software, SaaS subscriptions are an expense that is deducted each tax period. Given that the SaaS

subscription fees are expensed there is not a material “hit” on an enterprise’s financials and reporting if the SaaS doesn’t work out as intended.

## **SaaS for Software Companies**

SaaS has also enabled innovations for software companies that have also contributed to the disruptions in the software industry. Consider first that a software vendor can quickly build and scale SaaS applications at a much lower cost and at a faster pace compared with the development and scaling of software that is deployed on premises.

More specifically, IaaS provides startups and growing software companies a robust infrastructure to leverage at a much lower cost than what was available in the past. Software companies no longer need to invest as much in hardware, physical facilities, and deep technical teams as in the past. This reduces a major cost for a startup and a growing concern, which, in turn, results in achieving positive cashflows and returns much faster.

The lower investment costs for infrastructure means, in turn, that venture capitalists, angel investors, and other sources of capital don’t need to invest as much money and resources to get a good financial return. Additionally, a new SaaS company can quickly take advantage of innovations in the cloud to build better offerings, for example, use of AI resources provided by cloud vendors. These factors are likely one of the critical drivers of the vast number of SaaS companies, particularly those focused on long-tail market opportunities in small-sized vertical market revenue opportunities.

Consider as well that SaaS companies have the benefit of developing software that only needs to work with a web browser. The software is built using modern tools that make software development less complex enabling faster and easier development. Software development and support resources can also be contracted globally so labor costs can be better managed. In sum, an important innovation with SaaS that has enabled disruption of the enterprise software industry is that it reduces the levels of investment and expenses to build and sell.

Additionally, SaaS is also easier to maintain for the software vendor because it has been built on modern technology and there is no need to maintain legacy code and functionality. Updating software to subscribers is simple, cheap, and easy; just change the software that runs in the cloud versus having to update the software at each subscriber’s site, which involves a lot of coordination including support services if the update is not done correctly or the customer needs assistance.

In fact, in our experience many enterprise and government licensees chose not to load updates to their on-premises software out of a concern that the update may cause problems and reduce overall functionality. The edict of “if something works, don’t fix it” is often applied by with their installed on premises software. But, as noted above, maintenance and update changes with SaaS are handled by the software vendor. This innovation saves time and resources as well as reduces risks compared with on-premises deployment for both subscribers and software companies.

Another innovation of SaaS that benefits software companies is that the sales cycle for selling SaaS to enterprises, while certainly much longer than the sales cycle for consumer SaaS, is generally shorter than with enterprise software sold via licenses and provisioned to be delivered on-premises. Selling a “pilot” commonly known as a POC (proof of concept) is easier and faster than selling a on-premise software solution that requires a prospective enterprise or government to invest substantial resources in hardware, software configuration/customization, training, and time, nearly all of which would have to be written off if the software fails to meet expectations.

Think for the moment about the position of a CTO or CIO; s/he would likely suffer a career impact if the software fails after the investment has been made. By contrast, with SaaS, a pilot can be quickly setup, the software evaluated, and issues raised regarding what needs to be done with the software at a very low financial price and minimal risk – the subscription fees for at most a year, but more likely a few months. This reduction in risks translates into faster sales cycles for many SaaS applications which further reduces capital needs for a SaaS company, a further innovation.

Finally, the overall development model for SaaS makes it easy and less expensive to experiment, learn from the experience, and make better software and revisions to the software company’s business design as a result. One example would be testing the use of reseller partners and updating the software per what is learnt in the field from reseller partners.

## INDUSTRY FINANCIAL METRICS HAVE CHANGED

One of the more interesting innovations related to SaaS disrupting the enterprise software industry is the fact that the metrics used to value SaaS companies as well as to assess a SaaS company as an investment opportunity have changed (Damodaran, 2018). Following GAAP standards and principles software companies selling on-premises licenses to software products have traditionally been assessed and valued on income statement finance metrics like gross margins, net margins, cash flows, and other metrics including the size of their license base, churn (customer loyalty), and value of intellectual property assets.

GAAP standards and principles related to income statement analysis, however, inadequately reflect the earnings potential of growing SaaS companies (Bandulet, 2016). While company management decisions obviously vary by the company, their SaaS subscription base, macro factors, and other variables, in our experience SaaS companies that are rapidly growing often reach a tipping point where the cost of subscriber acquisitions declines and margins, already high, grow. Additionally, management, particularly at publicly-traded SaaS companies may choose to make decisions that further reduce expenses, thus, increasing profitability and shareholder value. For example, SaaS companies will often implement policies that reduce expenses while having relatively minor impacts on churn. This tradeoff decision is reflected in one of the metrics now in use with SaaS companies, the Rule of 40, as we discuss below.

In fact, analysts now consider a range of additional metrics for SaaS companies that complement GAAP standards and principles (Mosaic, 2024). While we could write an entire paper on SaaS metrics, we will discuss only a small set here and emphasize that these metrics and other SaaS metrics should be considered along with GAAP principles when assessing and valuing SaaS companies.

Among the more prominent metrics we have seen the following being used by SaaS companies, investors, and analysts: Rule of 40, noted above, ARR, MRR, CAC, and CLTV.

The Rule of 40 suggests that for a SaaS company to be considered healthy and well-balanced in terms of growth and profitability, the sum of its revenue growth rate and EBITDA margin should be at least 40 percent. A healthy SaaS company should see its EBITDA margin increase once they reach a certain size where revenue growth slows down (Scaleview Partners, 2024).

The metrics ARR and MRR represent the annualized and monthly value of recurring revenue from subscriptions or contracts with customers and excludes one-time fees and non-recurring revenue. These metrics provide insight on the predictability and growth of revenue for a SaaS businesses.

CAC means customer acquisition cost and measures the cost of acquiring a new customer for a company. CAC is important because it helps companies better understand how much it is costing them to acquire a new subscriber.

Finally, the metric CLTV which stands for customer lifetime value which estimates the average gross revenue a customer will generate before they exit. This is calculated based on multiplying the average revenue per customer by the average customer lifespan. A company can better understand how changes in their products and pricing are impacting their overall financial health.

## CONCLUSIONS

Our objective in this paper was to discuss how SaaS has benefited from technology and business innovations to disrupt the enterprise software industry. We discussed the software industry and how SaaS companies by leveraging cloud technologies have achieved a dominant position relative to software licensed as a product and deployed on premises. We also covered some of the specific advantages that SaaS provides to users and sellers of SaaS software. Lastly, we provided another example of the downstream impact of SaaS on innovations – metrics used to assess and value SaaS companies that complement GAAP principles.

Looking ahead, we can expect SaaS revenue growth as an industry to continue to grow at a reasonably fast pace due to several factors. Consider, first, since SaaS is now the default method for acquiring access to enterprise software, software vendors that have not transitioned from on premise licensing software as a product will do so to remain relevant in the marketplace. Second, existing SaaS vendors will continue to grow the functionality of their applications

to compete against niche vendors creating more revenue opportunities. Third, AI is a buzz now and is rapidly being introduced into our lives. We expect SaaS vendors to weave AI into their offerings which will result in their revenue increasing faster due to greater functionality and efficiencies generated for enterprise subscribers. Finally, with AI, we expect to see many new SaaS companies entering the marketplace with new applications having unique and powerful functionality in financial services, health care, retail, e-commerce, distribution, education and other sectors.

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# Analyzing the Outcomes of the Learning Objectives when Business Intelligence and Big Data Analytics are Incorporated in a Database Course

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## ABSTRACT

The learning objectives of introductory database courses were changed about twenty years ago to incorporate the changing role of data that was occurring in the world. Data were being viewed in new ways for analysis and techniques were being developed to better store, retrieve, and analyze the data. The structure known as the Data Warehouse was developed throughout the 1990s as a method of modifying the data and storing it permanently. Techniques were developed to access the data residing in the warehouses in ways that led to easy analysis of the data. Online Analytical Processing (OLAP) tools and data mining techniques became standards. IT professionals developed structures to capture and maintain very large amounts of data and allow for relatively stress-free retrieval. This paper provides a statistical study of the outcomes of learning objectives of business intelligence and big data analytics in an introductory database course at a large urban public university. Since business intelligence and big data analytics are relatively new, the time period under consideration covers the years 2017 through 2024. The study considers different outcomes in sections that are delivered in the instructor-led format versus the online format. The study also considers the varying outcomes of the learning objectives during spring and fall semesters and the shortened summer session. A factorial ANOVA model is used to measure the significance of the differences in the means of outcomes of learning objectives in categorized sections of the database course. There is not enough evidence to conclude that differences exist in the semester in which the course is taken. However, there are significant differences in the means of the outcomes of learning objectives between instructor-led sections and online sections.

**Keywords:** Business Intelligence, Big Data Analytics. Online courses, Instructor-led courses

## INTRODUCTION

The past couple of decades has seen a marked advancement in the way in which data are collected, generated, stored, viewed, and analyzed. For decades, information technology professionals simply viewed data as bits of information that fit nicely into two dimensional arrays. As the world changed and exponentially more data were being generated, the overall view of data needed to change as well. IT professionals' view of the data became more focused upon the data itself. While much of today's data continue to reside in the conventional tables of relational database systems, an increasing percentage of the data collected by organizations now resides in alternative structures. Historical data are extracted from conventional operational databases, cleaned, often summarized, and loaded into data warehouses. These data warehouses have their own structure for storing the data and their own set of rules for extracting it. Big data, data that comes to organizations in large volumes and at a high velocity require a special structure to maintain the data. The Hadoop system was designed specifically for organizations that require the management of big data.

For decades, data were retrieved from the two-dimensional arrays driven by primary key and foreign key relationships. The Structured Query Language (SQL) protocol was (and still is) regarded as the gold standard for extracting data from the tables. Although SQL allows the analyst the ability to extract and transform the data in an almost infinite number of ways, it normally does not allow the analyst to directly employ sophisticated analytical tools. The development of a host of tools around the data warehouse allows the analyst to quickly extract the data and transform it into high level information. Business intelligence (BI) refers to the application of the tools and techniques that allow data analysts to easily transform data into high level information.

Metropolitan State University of Denver is a large public university in downtown Denver that serves the greater seven county metropolitan area. The University offers courses in the traditional spring and fall format with summer courses being offered which run at twice the rate of the spring and fall semester. The University offers courses in both the traditional instructor-led, in class, brick and mortar framework and in the online format. All courses that are taught in both the instructor-led format and online format must adhere to a single set of learning objectives and must be assessed with the same rigor. The Computer Information Systems and Business Analytics (CISBA) department is housed in the College of Business. The College of Business is an AACSB accredited program and the CISBA Department is additionally accredited by ABET. Besides the program in Computer Information Systems, the CISBA Department offers degrees in Business Analytics and Business Intelligence. The College of Business and the CISBA Department

offer both undergraduate and graduate degrees. This paper focuses on the Database Management Systems (DMS) course that is taught by the author. The DMS course is a junior level course that is required for all CISBA majors and minors. The DMS course is also required for Health Care Management majors, some Communications majors, some Construction Management majors, and some Aerospace majors. Although most of the students enroll in the DMS course to fulfill a major or minor requirement, randomly interested students from around the University also enroll.

The DMS course is taught in both the instructor-led and online versions in the spring and fall semesters. However, the DMS course is only taught in the online version during the summer. The instructor-led version follows the traditional structure of courses taught in the classroom. The course is delivered as a lecture with ample opportunity for student interaction. Learning is assessed through in-class examinations and assignments. The online version of the DMS course incorporates some lectures on Microsoft Teams (recorded for those who miss the live Teams session) along with other resources including readings, power point slides, videos, exercises from the textbook, and discussion pages. The online version of the course is assessed by examinations monitored by ProctorU, unproctored quizzes, and assignments. Identical assessment standards are maintained between the instructor-led and online versions of the course. The College of Business generally makes a tutor available for all students enrolled in the DMS course. Learning objectives for the course undergo periodic review which allows the course to evolve. The course's structure was modified and expanded about twenty years ago to incorporate the BI learning objectives. The Big Data Analytics (BDA) learning objectives were approved around 2015 and fully integrated into the DMS course in 2017. The data used for this study begins in the spring semester of 2017 when the BI and BDA would have been fully incorporated into the course.

This paper focuses upon the assessment of the two learning objectives of BI and BDA. Data have been collected from the assessment instruments for each section over the time period. This paper uses a factorial Analysis of Variance technique to measure and compare the outcomes associated with the learning objectives of BI and BDA. In particular, the differences in outcomes between instructor-led and online delivery are measured.

## **LITERATURE REVIEW AND BACKGROUND**

The DMS course provides the student with a broad background in an important area of the information systems' discipline. The course provides an introduction to the basic structure of databases including database design, normalization, E-R modelling, and implementation on an electronic DBMS. The DMS course also covers emerging topics like BI and BDA. Following is some very limited general information that briefly covers the highly complex topics of BI and BDA.

BI is an older term first used in 1958 (Ragazou, et al., 2023, p.2) but had a variety of meanings in the literature. Modern BI grew out of the quest for a functional data warehouse in the 1990's. The data warehouse provided a structure that information professionals could use to maintain historical data in a multidimensional format that could be accessed by high level analytical tools. The data warehouse became a repository of the businesses' historical data as well as other concurrent data. The purpose of the data warehouse structure shifted focus from a transaction processing system to a decision support system. Tools were developed that allowed decision-makers to analyze the data in the DSS to aid in their business decisions. Like all emerging technologies, the definition of BI is constantly in a state of change. The definition of BI has become broader over time and has encompassed other technologies such as Business Analytics, and even more traditional disciplines such as Management Science and Operations Research. A very broad definition of BI is found in (Elena, 2011, p.3): "Business Intelligence is a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision-making." The CISBA Department offers a highly successful program culminating in a bachelor's degree in BI. While the DMS course provides a learning module in BI, the CISBA Department covers the BI discipline in depth.

"Big Data" is a term that has been applied to the generation of massive amounts of data. Conceptually, the volume of data generated would overwhelm the relational database systems that have existed since the 1980s. In addition to the sheer volume of data that is generated, the concept of big data requires that data move rapidly through the business' data network. A final requirement for the definition of big data to exist is the concept of heterogeneity. All the data must not be of the same type (i.e. not have identical structures, formats, sources, etc.). Hence, the classic definition of big data are the 3Vs: large volume, high velocity, and variety. Another way to look at big data is through a hierarchy. Big data can be transformed into information (answers the who, what, why, and when) which is the classic view of the relationship between data and information. Further, information is transformed into knowledge which

seeks to uncover the patterns, trends, and relationships within the information. Finally, there is wisdom which processes the underlying knowledge to arrive at well-informed decisions that form the basis of effective actions (Baskarada & Koronios, 2013). There are many other definitions of big data that have evolved over time. For an interesting discussion of big data definitions, see (Favaretto, et al., 2020). The Hadoop and MapReduce systems are the methods that have been traditionally used to store and retrieve big data. "...Hadoop is a framework that allows for the distributed processing of large data sets across clusters of commodity computers using a simple programming model." (Hannan, 2016, p.31). While the Hadoop Distributed File System (HDFS) serves as a repository for the redundant packets of data, MapReduce is a programming model within the Hadoop system that accesses the data stored in the HDFS. "MapReduce is a framework pioneered by Google for processing large amounts of data in a distributed environment. Due to the simplicity of its programming model and the runtime tolerance for node failures. MapReduce is widely used by companies such as Facebook, the New York Times, etc." (Hannan, 2016, p.32). There is an ecosystem that has developed around the Hadoop framework that consists of tools for analysis, querying, and processing of the data. These are some of the important topics covered in the DMS course at a somewhat cursory level. The CISBA department has several courses devoted specifically to BDA. BI has been a part of the DMS curriculum since about 2015. BDA learning objectives were added to the DMS course in 2017. BI and BDA comprise about 20 to 25 percent of the curriculum of the DMS course.

A course such as the DMS can be difficult to assess. Students enroll from many different areas within the university and enter the course with a wide range of backgrounds and skills. Student expectations may differ. Majors in the CISBA Departments may anticipate mastering material that will prepare them for future courses in the major. Health Care Professionals may view the course as providing cursory knowledge of database that will sometimes aid them in their careers. There must be a mechanism in place to assess how well all students have mastered the set of learning objectives. Panter and Williford state: "Learning outcomes describe measurable knowledge, skills, and behaviors that students should be able to demonstrate as a result of completing the program." (Panter and Williford 2018, p. 3). The learning objectives for the course must be measured by some evaluation instrument. As stated by Garfalo and L-Huillier, the objectives must be measured and there needs to be a level of proof that the learning has taken place: "Ultimately, assessment (for accreditation) is conducted to bring about improvement at all levels from course-to-program-to-the-institution. This is accomplished by establishing clear and measurable outcomes of student learning and by documenting and demonstrating that student learning has occurred." (Garfalo and L'Huillier 2015, p.153).

A course must continue to evolve and improve. Painter and Williford further state: "Assessing learning outcomes is a form of program and curriculum evaluation with the goal of continuous program improvement." (Panter and Williford 2018, p. 4). The ABET Manual also addresses the importance of continuous improvement with the statement "Assessment of student learning, with a focus on continuous improvement, is key to ensuring the quality of our educational programs and preparing our graduates to enter a global workforce." (ABET Manual 2022). The ABET Manual also concludes: "In an era of accountability and transparency, outcomes assessment has become an international standard of quality." (ABET Manual 2022). Course designers must be able to develop learning outcome objectives that are quantifiable and measurable. By measuring the student learning objectives, the course instructors are able to statistically analyze how well the objectives are being met and ultimately to modify the course to moderate weakness and to improve the quality of the course.

## **DATA FOR THE STUDY**

This study includes data gathered from twenty-two sections of the DMS course from the spring semester, 2017 through the summer semester, 2024. There were 572 students who participated in this study. Thirteen of the sections were taught in the online format while the remaining nine sections were taught in a conventional classroom setting (instructor-led). The author taught all the sections included in this study so there would be no bias due to multiple instructors. The BI and BDA objectives were assessed through objective (multiple choice or matching) questions delivered through exams and quizzes. Each response was assessed by a single, objective answer. Since each question resulted in a binary outcome of correct or incorrect, each question would result in a percentage of students who answered that question correctly. The percentage of the students who answered the question correctly then became the Score for that question. Questions varied from section to section, but the level of difficulty remained standardized throughout all the sections. The questions were carefully vetted to ensure consistency from section to section and from instructor-led sections to online sections.

The CISBA Department has established an expectation that attaining at least an average score of seventy percent on the assessment would be expected. Table 1 presents descriptive statistics for BI scores around the data set without

respect to the section in columns 1 through 5. Column 6 (Difference) is the Mean less the expected score of seventy. The ILScores and OLScores represent the instructor-led and online scores, respectively. The SpScores, SuScores, and FaScores represent the spring, summer, and fall semesters, respectively. The means of the categories are generally around eighty. Table 1 presents the descriptive statistics categorized by the delivery method and the semester.

Each of the means in Table 1 is tested for being greater than the expected score of seventy by defining the null and alternative hypotheses below. The test is designed as one tailed.

$$H_0: \mu \leq 70$$

$$H_a: \mu > 70$$

**Table 1: Business Intelligence Scores. One-Tailed T-Test for the Significance of Categorized Questions Based Upon an Expected Score of 70.**

Category	N	Mean	StDev	SE Mean	Difference	T-Value	P-Value
ILScores	45	78.46	21.39	3.19	8.46	2.65	0.006 <sup>1</sup>
OLScores	63	85.70	19.01	2.40	15.7	6.55	0.000 <sup>1</sup>
SpScores	53	77.38	20.12	2.76	7.38	2.67	0.005 <sup>1</sup>
SuScores	15	83.92	22.79	5.89	13.92	2.36	0.017 <sup>2</sup>
FaScores	40	89.23	17.81	2.82	19.23	6.83	0.000 <sup>1</sup>

1. represents values significant at the alpha = 0.01 level.

2. represents values significant at the alpha = 0.05 level.

The last two columns present the results of the hypothesis test for the BI learning objectives. All the means are significantly greater than seventy which indicates that the students are meeting the expectations of the department regardless of the delivery method or the semester in which the course is taken.

Table 2 presents descriptive statistics for BDA scores around the data set without respect to the section in columns 1 through 5. Like the BI presentation above, Column 6 (Difference) is the Mean less the expected score of seventy. The ILScores and OLScores represent the instructor-led and online scores, respectively. The SpScores, SuScores, and FaScores represent the spring, summer, and fall semesters, respectively. The means of the categories are generally somewhat lower than the means of BI scores. Table 2 presents the descriptive statistics categorized by the delivery method and the semester.

$$H_0: \mu \leq 70$$

$$H_a: \mu > 70$$

**Table 2: Big Data Analytics Scores. One-Tailed T-Test for the Significance of Categorized Questions Based Upon an Expected Score of 70.**

Category	N	Mean	StDev	SE Mean	Difference	T-Value	P-Value
ILScores	90	66.14	23.05	2.43	-3.86	-1.59	0.942
OLScores	138	84.13	16.71	1.42	14.13	9.93	0.000 <sup>1</sup>
SpScores	100	75.22	20.83	2.08	5.22	2.51	0.007 <sup>1</sup>
SuScores	48	81.91	18.16	2.62	11.91	4.54	0.000 <sup>1</sup>
FaScores	80	76.35	23.38	2.61	6.35	2.43	0.009 <sup>1</sup>

1. represents values significant at the alpha = 0.01 level.

The mean score of the instructor-led sections (M = 66.14 SD = 23.05) is very low and does not meet the goal of the department. However, the remaining mean scores are all significantly above seventy and thus indicate that students are performing at a level that meets expectations. One might expect that students in the live section would perform better than those students in the online section. Also, students normally perform somewhat better in the regular sixteen-week semesters than in the summer semester. The unexpected results might be due to the recent introduction of BDA into the course curriculum. Also, the DMS course was taught only four times in the summer semester and all those sections were delivered in the online format. COVID-19 was a major factor during the time frame and may be responsible for some apparent contradictions in the results. It appears that some very good, highly motivated students

enrolled in the course during the four summer sections compared to the regular semesters. As time goes on and more data are collected, the summer sections will likely become more in line with the full semester sections.

Table 3 and Table 4 present the descriptive statistics that have been generated from the twenty-two sections covered by this study. For each section, the mean score was computed and recorded. The column for the standard deviation was computed for the section means. Table 3 presents the data categorized by the delivery method. The value of N denotes the number of sections that are included in each category. For example, the study included nine instructor-led and thirteen online sections. The standard deviation of 13.18 represents the standard deviation generated from the nine instructor-led sections of the course. Table 4 displays the descriptive statistics for the twenty-two sections categorized by semesters. Table 3 and Table 4 display the means and standard deviations of the sections as well as the traditional five number summary statistics of the data. The value of N denotes the number of sections that are included in each category.

**Table 3: Descriptive Statistics of the Learning Objectives based upon the Number of Sections Taught by Delivery Method.**

Delivery Method	Objective	Mean	Standard Deviation	Minimum Value	First Quartile	Median	Third Quartile	Maximum Value	N
Instructor Led	BI	78.46	13.18	62.14	67.64	72.50	91.78	98.73	9
	BDA	66.14	13.08	48.89	59.63	60.42	73.26	94.29	9
Online	BI	84.53	15.21	50.00	69.71	92.63	94.92	98.40	13
	BDA	84.22	7.41	70.14	77.80	85.71	89.45	94.10	13

As shown in Table 3, the means of the BI objectives are always greater than the means of the BDA objectives for each category. For the instructor-led sections, the BI mean ( $M = 78.46$ ) is greater than the BDA mean ( $M = 66.14$ ) and for the online sections the BI mean ( $M = 84.53$ ) is slightly greater than the BDA mean ( $M = 84.22$ ). The BI objective has been a part of the DMS course for many years while the BDA objective is relatively new. Also, students in the online sections performed better than students in the instructor-led sections. While unexpected, this isn't all that surprising. Online students are provided with a wealth of resources that will help those who are truly motivated become very successful. Also, the COVID-19 epidemic cuts right through the heart of the time period under study. Many students were either required to or opted to enroll in online sections when they normally would have enrolled in the instructor-led sections. It's likely online students were more motivated during the epidemic than at more "normal" times.

Table 4 also provides data that show student learners generally perform better on the BI learning objective than on the BDA learning objective. For the spring and fall semesters, the means of the BI objective were  $M = 78.27$  and  $M = 89.23$ , respectively. The BI objective means exceed the BDA means of  $M = 75.22$  and  $M = 76.35$ , respectively. However, the BDA mean of  $M = 81.78$  exceeds the BI mean of  $M = 77.10$  for the four sections taught in the summer semester.

**Table 4: Descriptive Statistics of the Learning Objectives based upon the Number of Sections Taught by Semester.**

Semester	Objective	Mean	Standard Deviation	Minimum Value	First Quartile	Median	Third Quartile	Maximum Value	N
Spring	BI	78.27	11.25	62.14	68.71	76.94	88.85	93.57	10
	BDA	75.22	13.49	59.49	60.26	76.15	87.91	93.00	10
Summer	BI	77.10	22.72	50.00	54.17	81.11	96.03	96.19	4
	BDA	81.78	9.44	70.14	72.13	83.49	89.72	90.00	4
Fall	BI	89.23	12.10	67.59	77.53	94.23	97.69	98.73	8
	BDA	76.35	15.75	48.89	63.65	77.19	91.89	94.29	8

#### ANOVA MODEL

The DMS course covers a wide range of topics. Some of the more detailed theoretical topics include developing the database model, normalizing of the data contained in the database, and implementing the database within the framework of an Oracle DBMS. Another major topic covered by the DMS course is learning to program using the SQL programming language. This would include writing code to create the structure of the database and then writing code to extract the data and otherwise manipulate the database. The DMS course also provides an overview of database security and how to construct a distributed database. The two most recent learning objectives of the DMS course consist of a rather in-depth analysis of BI and of BDA. ABET requires that all course objectives should adhere to a set of standards. Even though BI and BDA aren't the primary focus of the course, they must meet the course standards. There is an expectation that student learners perform to a level of mastery equally well on all course learning objectives.

Even though the course objectives are the same for all versions of the course, the delivery methods are quite different. The instructor-led version of the course meets twice each week. The format of the instructor-led version mirrors the more traditional view of education with an instructor lecturing and leading discussions. The students are active learners who interact with one another and with the instructor. The online version of the DMS course requires students to become far more proactive than those sitting in the classroom. Clearly, it is impossible to replicate the classroom environment for online learning. Online students are provided with a wide variety of resources to help them succeed. These resources include links to articles, links to videos, multithreaded discussion networks, and access to the instructor and to a tutor. The instructor will often provide lectures over Microsoft Teams for those students who are able to attend the live lecture. However, online students are expected to perform at the same level as the instructor-led students and are assessed by a set of identical standards.

Student learners in the summer semester are provided with the same resources as students in the full-term (spring and fall) semesters. However, since the summer semester is eight weeks in length as opposed to sixteen weeks in length for the full-term semesters, the summer semester moves twice as fast as the full-term semesters. Differences in performance between the summer semester and the full-term semesters would likely be linked to the effort put forth by students who enroll in the course in the summertime.

The first hypothesis considers the difference in the value of the means of the BI course learning objective and the BDA course learning objective. If student learners are performing equally well with the BI material and the BDA

material, there will be no difference between the means of the two learning objectives. The statistical test assumes that there will be no difference between the two learning objective means and accept the alternative if enough statistical evidence is generated. The one-way ANOVA test is used to test the significance of the difference between the means. Below are the null and alternative hypotheses that will be tested.

- (1)  $H_0$ : the average section mean scores of the course objectives are equal for BI and BDA.  
 $H_a$ : the average means scores of the course objectives for BI and BDA differ from one another.

A one-factor ANOVA model examines the effects of the mean course objective scores on the delivery method of the course. The data seem to suggest that online student learners perform better than instructor-led student learners for both the BI and BDA learning objectives. For both learning objectives, the hypothesis would state that the mean score for the instructor-led sections would be equal to the mean score of the online sections. The null and alternative hypotheses for the equality of the learning objective means for the delivery methods is shown below.

- (2)  $H_0$ : the mean of each course learning objective is equal for each of the delivery methods.  
 $H_a$ : the mean of the course learning objective is different for the delivery method.

A one-factor ANOVA model examines the effects of the mean course objective scores on the semester the course was taken. The student learners perform best in the fall semester as measured by the BI learning objective and perform best in the summer semester as measured by the BDA learning objective. For both of the learning objectives, the mean score for the three semesters are hypothesized to be equal. The null and alternative hypotheses for the equality of the learning objective means for the semester the course was taken is shown below.

- (3)  $H_0$ : the mean of each course objective is equal for each of the semesters.  
 $H_a$ : the mean of a course objective is different for at least one semester.

The information in Table 5 displays the results of Hypothesis Test 1. The F-ratio of  $F(1,86) = 3.17$ ,  $p < 0.10$  is significant at the 0.10 level indicating that the means for the course learning objectives are different with ninety percent confidence. There is ninety percent confidence that the BI learning objective mean ( $M = 82.05$   $SD = 14.25$ ) is different from the BDA mean ( $M = 76.83$   $SD = 13.24$ ).

**Table 5: Factorial ANOVA Results – Statistical Significance of the Difference in the Means of the BI and BDA Sections (Hypothesis Test 1)**

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F-Value	P-Value
Objectives	1	599.4	599.4	3.17 <sup>1</sup>	0.079 <sup>1</sup>
Error	86	16260.9	189.1		
Total	87	16860.3			

represents values significant at the alpha = 0.10 level.

A factorial ANOVA was conducted to compare the effects of the course delivery methods on the mean scores students earned on each of the learning objectives. Table 6 presents the results of Hypothesis Test 2. Instructor-led students earned a mean score on the BI objective that is 6.04 points lower than the mean score earned by the online students. This difference is not statistically significant yielding an F-ratio of  $F(1,20) = 0.94$ ,  $p = 0.343$ . The data suggests that student learners do well (both means near 80) on the BI objective regardless of the course delivery method. The difference in the BDA means between instructor-led and online delivery is -18.08. This result is statistically significant,  $(F(1,20) = 17.15, p < .01)$ , indicating that online student learners are performing much better than instructor-led learners. This difference in performance is interesting in that online learners usually do not perform as well as instructor-led learners. It's fascinating to speculate on the impact of COVID-19 on the educational system and what role the epidemic played over the time period. It will be curious to see if the difference between online and instructor-led objective means begin to even out in the future.

**Table 6: Factorial ANOVA Results - Statistical Significance of the Difference in the Means of the Instructor-led and Online Sections (Hypothesis Test 2)**

Objective	Instructor-Led (N = 9)		Online (N = 13)		Difference in Means	F-Value	P-Value
	Mean	St.Dev.	Mean	St.Dev.			
BI	78.46	13.18	84.53	15.21	-6.07	0.94	0.343
BDA	66.14	13.08	84.22	7.41	-18.08	17.15	0.001 <sup>1</sup>

1. represents values significant at the alpha = 0.01 level.

Table 7 reports the results of the means of the learning objectives based upon the semester the course was taken. The fall semester mean for BI appears to be very high at 89.23 (SD = 12.10) compared to the means of the spring and summer semesters 78.27 (SD = 11.25) and 77.10 (SD = 22.70), respectively. However, there is not a statistically significant difference among the three means  $F(2,20) p = .214$ . The means of the BDA sections also are not significantly different from one another  $F(2,20) = 0.33$  and  $p = 0.724$ . As more data are developed in the future, differences in the time of year that the DMS course is taken may be revealed. However, with the somewhat limited time frame of this study, there is no evidence of differences in outcomes of learning objectives based upon which semesters the students chose to take the course.

**Table 7: Factorial ANOVA Results - Statistical Significance of the Difference in the Means of the Spring, Summer, and Fall Sections (Hypothesis Test 3)**

Objective	Spring Semester (N = 10)		Summer Semester (N = 4)		Fall Semester (N = 8)		F-Value	P-Value
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.		
BI	78.27	11.25	77.10	22.70	89.23	12.10	1.67	0.214
BDA	75.22	13.49	81.78	9.44	76.35	15.75	0.33	0.724

## CONCLUSIONS

BI and BDA are two of the most crucial concepts in the information systems discipline today. An exposure to these topics is essential for almost everyone who graduates with a university degree. This study examines student learning outcomes of BI and BDA as they are being taught in a beginning database management systems course for the period spring, 2017 through summer, 2024. The data for the study are developed through assessment given to students and are scored on a percentage basis of the number of questions answered correctly. The database management systems course is required for students in all majors within the CISBA department plus students from many other majors throughout the university. Additionally, many students opt to take the course as an elective. Although BI and BDA are not the focus of the database management systems course, they are an essential part of the curriculum occupying about twenty to twenty-five percent of the course's scheduled timeframe. The database management systems course provides the only exposure to BI and BDA concepts that most of the enrolled students will receive.

Students were placed in categories (factors) based upon the semester in which they took the course and if the course was delivered live (instructor-led) or virtually (online) for the BI and BDA objectives. First, the CISBA department has established an arbitrary goal of a score of seventy percent on any learning objective. The goal of seventy percent is strictly an internal control which has been mostly achieved according to the data from this study. The BI outcomes produce means that are slightly, yet significantly, higher than the BDA outcome means. The means from the online sections were higher than the means from the instructor-led sections for the BDA objectives but not for the BI objectives. Also, students performed statistically the same in the spring, summer, and fall sections for both the BI and BDA objectives.

BI and BDA are relatively new and are still growing and changing. Instructors in the DMS course continue to modify and enhance the modules devoted to these new areas on a regular basis. Instructors regularly participate in the Rocky Mountain Oracle User's Group's Training Days each spring. Instructors also participate in the annual Data Conference



sponsored by Oracle annually in California. All the instructors who teach the DMS course participate in academic conferences and workshops.

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# Integrating Sustainability into Supplier Management: A Classroom Exercise for SMEs Using the Kraljic Matrix and Sustainability Measurement Tool

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## ABSTRACT

This paper provides an in-class exercise that examines the supply chain management practices of Small and Medium Enterprises (SMEs), as it relates to supplier monitoring and qualification. Although cost and delivery performance are commonly prioritized in supplier evaluation, here it is demonstrated that incorporating sustainability considerations offers a broader perspective that may reveal risks and opportunities not captured by traditional metrics alone. Using a newly developed Sustainability Measurement Tool (SMT), SMEs can assess suppliers holistically, focusing on the environmental, social, and economic dimensions of sustainability, in addition to the core operational metrics which are considered regarding the Kraljic Matrix. The focus of this exercise is SMEs, which play a critical role in global supply chains and often face resource constraints that prevent them from fully integrating sustainability into their operations.

The exercise provided is a two-day classroom event, which engages students in hands-on analysis of supply chain metrics and sustainability. As a result, the exercise helps students understand how SMEs can consider supplier management beyond typical considerations. This approach enhances student comprehension of supply chain dynamics within the context of sustainability.

**Keywords:** sustainability, supply chain, supplier qualification, supplier monitoring, supplier management

## INTRODUCTION

Supplier qualifications and monitoring are critical components in today's competitive and global business environment. Such activities allow for robust supply chains, optimized for supply availability. These endeavors have traditionally emphasized metrics such as cost, quality, delivery and risk performance (ASQ, 2020). These metrics allow for clear and quantifiable measures of supplier effectiveness.

However, the world is changing in terms of what might be necessary to evaluate supply chains. Specifically, the growing demand for corporate responsibility and sustainability has introduced new dimensions for consideration. Indeed, the "triple bottom line" notion considers the interconnectedness of three separate dimensions: social, economic, and environmental factors. However, Elkington, the originator of this concept, urges organizations and businesses to move beyond what currently exists as profit-centric approaches to sustainability, advocating for a more holistic approach to these dimensions (Elkington, 2018). Thus, although cost and performance remain essential, the integration of sustainability metrics offers a more holistic view of supplier qualifications.

As perspectives change in terms of supply chain metrics, Small and Medium Enterprises (SMEs) often operate with limited resources and thus face significant challenges when considering an expanded view of supply chain metrics. Despite this challenge, the integration of sustainability factors into supplier monitoring processes is important and thus essential to SMEs, as SMEs serve as the backbone of the global economy (Tanner Okun et al., 2010). Such integration provides opportunities to mitigate risks and uncover long-term benefits that might be overlooked when focusing solely on traditional metrics.

This paper provides a two-day classroom exercise that aims to demonstrate to students that incorporating sustainability metrics into the supplier qualification and monitoring process can impact the selection of a supplier, especially when tools like the Kraljic Matrix and a newly developed Sustainability Measurement Tool (SMT) are applied. This exercise is appropriate for operations management and supply chain management students and is best suited after the notions of the Kraljic Matrix and Factor Rating Methods have been introduced.

## THEORETICAL BASIS

Supplier selection and monitoring is an important aspect of operations management. The purpose of these activities is to ensure that goods and services satisfy customer needs (ASQ, 2020).

Beyond pricing, organizations also often consider reliability of delivery (ASQ, 2020). Other metrics are also often considered, such as risk potential, costs of transactions, and capacity requirements, among others (ASQ, 2020). A number of mechanisms exist by which an organization can evaluate its supply chain, including the Kraljic Matrix, the Factor Rating Method, and the SCOR Model, among others. Additionally, common International Quality Standards, such as ISO 9001, require mechanisms for supplier management, including selection and monitoring (QMII, 2023).

The Kraljic Matrix prioritizes suppliers or supplies based on their risk and cost, categorizing them as: strategic, bottleneck, leverage, and non-critical (Webb, 2017). Strategic suppliers are those that are considered high risk and high cost. Bottleneck suppliers are high risk but are of lower cost. Leverage suppliers are low risk but are of high cost. Non-critical suppliers are low risk and low cost. This tool can assist an organization in efforts to reduce risk and increase profit.

The Factor Rating Method is a decision-making facilitation tool commonly used in determining plant location or selecting suppliers. This tool involves management developing critical criteria by which to evaluate the choices under consideration. These criteria are weighted by importance; a rating system is applied to determine the extent of the presence of the pre-established criteria, and a weighted score for each choice under consideration results, providing a quantitative comparison.

The Supply Chain Operations Reference (SCOR) model, developed by the Association for Supply Chain Management (ASCM), provides a comprehensive framework to assess and improve supply chains (White, 2021). This model provides a framework for the integration of business processes, best practices, benchmarking, and various metrics to assist organizations with supplier management.

However, public attention on supply chains is increasing, particularly with emphasis now placed on sustainability resulting from the growing emphasis of Environmental, Social, and Governance outcomes. For example, on February 3, 2023, a Norfolk Southern train carrying hazardous materials derailed in East Palestine, Ohio, sparking an environmental crisis (Sullivan, 2023). Later analysis showed that the crisis was caused in part by railroad deregulation that allowed longer, mixed-freight trains, increasing shareholder wealth at the expense of safety (Buck, 2022; Stancil, 2023). This situation may be viewed as a sacrifice of environmental and societal concerns to instead benefit economic outcomes.

This disaster and similar incidents demonstrate the importance of sustainability in the supply chain, as they impact people, the economy, and the environment—the “three pillars of sustainability,” as coined by John Elkington in 1994, generally known as the “triple bottom line” or TBL (Elkington, 2018). Indeed, Anderson (2005) establishes a business case to consider sustainability as a vital part of risk management, since such actions can reduce costs, increase long-term profitability, and increase long-term share value.

These growing efforts to account for sustainability and ESG metrics also encompass small and medium enterprises (SMEs). As the backbone of the supply chain and major job creators in the global economy (Tanner Okun et al., 2010), SMEs are vital, yet they lag larger companies in sustainability efforts (Ojiambo, 2023). With sustainability reporting and regulations like the German Act on Due Diligence in Supply Chains and the EU's Corporate Sustainability Due Diligence Directive, SMEs risk losing business if they fail to comply with these new standards required by larger companies. Thus, SMEs need a straightforward methodology to evaluate sustainability in their supply chains while considering their limited resources. One such tool is the Sustainability Measurement Tool (SMT).

The Sustainability Measurement Tool (SMT) evaluates organizations' environmental, social, and economic performance (Kessler and Walters, 2021). In the SMT, each supplier's environmental, social, and economic scores, as derived from rubrics for each dimension, are multiplied for a product termed the Triple Bottom Line Score (TBLs). Further, the SMT assigns a color to that score that allows suppliers to be visually contrasted and compared because of their TBLs.

## INSTRUCTIONS FOR RUNNING THE EXERCISE

This exercise presupposes some knowledge of the Kraljic Matrix and the Factor Rating Method as it applies to supplier management. Further, students should have the same familiarity with the term Triple Bottom Line as it relates to sustainability. However, if these concepts have not yet been introduced, the instructor can provide insight into these concepts and tools, using this exercise to demonstrate the notions and tools.

Further, this exercise uses online discussion board, group work, and in-class discussion with application. Prior to the first session, students are provided with a thought-provoking question regarding supplier management process and sustainability.

The exercise typically spans two 80-minute sessions, with the flexibility to adjust as needed. Instructors may find that not all the time allocated in the step-by-step instructions is fully consumed, allowing room for additional discussion or review as they see fit. For courses with 50-minute sessions, instructors may need to reduce the time spent on discussion questions or consider extending the exercise to three sessions to ensure thorough coverage.

### Step-by-step instructions: preparation

The instructor should explain this exercise helps students understand how SMEs can consider supplier management beyond typical considerations. This hands-on approach is to facilitate student comprehension of supply chain dynamics within the context of sustainability.

Prepare for the exercise by providing the following discussion question (or similar question) to students:

*Consider the inclusion of sustainability concerns in the small- and medium- enterprises' supplier selection and monitoring process. What, if any, long-term impact could this have on a company's competitive advantage that it achieves because of its supply chain?*

Students should ponder this question as individuals and prepare to discuss their thoughts with their groups at the first exercise session. Specifically, the instructor can create a digital discussion forum using the school's LMS learning system, and then invite the students to post relevant personal thoughts using articles and videos. The instructor should grade the contributions as positive if those contributions enhance conversations.

### Step-by-step instructions: class session 1

The objective of this first session is to have students evaluate tier 1 suppliers using traditional supply chain metrics, and think about the role sustainability may play in supplier selection and monitoring. This introduction should take no more than **five minutes**.

Assign students to small groups to discuss their individual insight into the assigned discussion question, with the discussion lasting approximately **ten minutes**. The instructor invites some groups to share their key thoughts concerning the question, ensuring each group has some input into this feedback, keeping the feedback time allotted as about **five minutes**.

The instructor synthesizes the input, perhaps by grouping ideas on a whiteboard, for about **five minutes**. Some typical student responses and possible follow up probing inquiries for the instructor are found as Table 1: Typical Student Responses to Opening Inquiry.

Distribute and assign Appendix A: In Class Handout to the students. Clarify for the students that the matrix displayed in the Appendix is a Kraljic Matrix. Review the notions of risk, such as access to infrastructure, sole supplier status, and a suppliers' indispensability to business, as risk examples, which comprise the Y-axis of the matrix. Briefly discuss cost analysis as the X-axis. Review the definition of tier 1 supplier. The review of these concepts should take no more than **five minutes**. Ask students to review the tier 1 suppliers and place the tier 1s as best they can on the matrix, completing the appendix to where it indicates "STOP HERE AND WAIT FOR YOUR INSTRUCTOR." Allow them about **ten minutes** to accomplish this task.

**Table 1: Typical Student Responses to Opening Inquiry**

Student Response	Probing Inquiries
Sustainability makes the supplier management process too complex.	How can this complexity ultimately lead to better long-term decision-making? Could the complexity actually reduce risk or add value over time?
Adding sustainability to the supplier management process makes the process too expensive.	Costs may increase initially, but how might this investment pay off in terms of brand reputation, customer loyalty, or risk? Is it possible for sustainability to enhance profitability?
Sustainability consideration aligns well with society's concern for ethics and the environment.	How could a failure to adapt to sustainability impact a company's market position or regulatory compliance in the future?
Measuring sustainability is difficult.	How could companies use technology to address this challenge? Do you think that technology is available now?
Sustainability incorporation may strengthen relationships with the suppliers.	How could stronger supplier relationships contribute to operational efficiency and innovation over time?

Invite feedback from select students with regard to categorization of the tier 1 suppliers. Answers may vary. Capture various considerations on a white board or similar. This display may best be accomplished by using a copy of the Kraljic Matrix and annotating it with the various groups' contributions. Maintain this document for future reference. Spend approximately **seven minutes** on this activity.

Refer students to Appendix A handout, and direct their attention to the *Pareto Analysis and ABC Costs* area of the handout. Explain the purpose of Pareto Analysis, in that it allows for a clear understanding of the contribution of some characteristics, such as cost in this case, to the whole. This Pareto Analysis illustrates the costs incurred by the fictional company XYZ in terms of its tier 1 suppliers. Explain how ABC cost analysis works, in that the costs can be broken down into categories, with A representing the largest costs, B representing the second largest costs, and C representing the lower costs. This brief overview should take about **five minutes**. In groups, students should classify each of the tier 1 suppliers as A, B, or C, taking about **five minutes** to do so. Invite several groups to provide feedback for approximately **five minutes**. Such feedback might be as follows. Category A could be Gamma, Zeta, Beta, Epsilon, Alpha, Delta, as these expenditures are in the millions. Category B could be Companies A, B, and C as these expenditures are in the hundreds of thousands. Category C could be Companies D, E, and Z, as they are in the tens of thousands. Make note of the highest cost (Category A) tier 1 suppliers.

Direct students to the *Factor Rating Method for Risk Analysis* area of the handout. Briefly explain the Factor Rating Method as a mechanism to evaluate various options under consideration based on predefined criteria, which are typically determined by management, with weights assigned to those criteria. Each option is then scored using those weighted criteria to determine the best choice. This explanation should take no more than **five minutes**.

In this case, the tier 1 suppliers are evaluated against various risk criteria, which are Access to Infrastructure, weighted at 20%; Sole Supplier Status, weighted at: 40%; and Indispensability to business, weighted at 40%. The tier 1s are rated as 1 = Very Low Risk; 2 = Low Risk; 3 = Average Risk; 4 = Moderate Risk; and 5 = High Risk.

Direct students in their groups to evaluate the Factor Rating table and indicate which tier 1 suppliers are the highest risk, allowing **five minutes** for this activity.. Students should recognize that the highest risk suppliers are Gamma and Zeta.

Using the original Kraljic Matrix document and using the ABC Analysis and Risk Analysis, map Gamma and Zeta into the Matrix using student feedback, allowing **five minutes** for this activity. Note that a SME would want to focus on both of these tier 1 suppliers. Prompt students to identify what category of the Matrix is the most important; students should indicate that the strategic supplier category is the most important. This importance comes from such suppliers

representing the highest cost as well as the highest risk. Thus, if a SME must choose which tier 1s on which to focus, that category is the most beneficial.

Solicit any feedback or questions from the class for the remaining time. Assign reading *Triple Bottom Line Scales (Rubrics) Evaluation Tool* of Appendix A handout for the next session. Assign students to consider this question for the next session.

*What are your thoughts about the content outlined for Social, Economic, and Environmental performance in the Triple Bottom Line scales - Why do you believe these scales are constructed in this way? Items to consider; DEI policies, wage fairness, profit margins, and environmental impacts, including GHG emissions and water usage. - In answering this question, consider recent news articles and current events.*

Dismiss class until next session.

### **Step-by-step instructions: class session 2**

The objective of this second session is to have students apply a mechanism to evaluate sustainability of tier 1 suppliers and how that sustainability application changes supplier selection and monitoring. The instructor should make this objective clear for the first **five minutes** of the session.

Students should again sit with their groups; students will discuss the assigned question and be prepared to provide a summary of their group consensus. Solicit feedback from the groups. The instructor should synthesize the feedback to demonstrate the credibility of the scales. This activity should take no more than **fifteen minutes**.

Students will access their work from Class Session 1, Appendix A. Pose the notion to students: even though suppliers identified from the last session are important with regard to the Kraljic Matrix, what happens when sustainability is introduced? Direct students to the Triple Bottom Line Scales (Rubrics) Evaluation Tool section of Appendix A handout.

Assign Gamma to some groups, and Zeta to the others. Refer students to the *Two Companies...What Are Their Triple Bottom Line Scores?* section of Appendix A. The groups score their assigned supplier using the provided scales; have the groups for each supplier write their scores on the board for comparison. Allow the students **ten to fifteen minutes** to accomplish this activity.

The groups, even for the same supplier, may differ regarding scoring. The key is for the students to be able to explain why they chose the score they did, if their scores differ greatly from what might be expected (i.e., scoring difference of 2 or greater). The scores should be similar to the following. Gamma's scores might be a social value of 5; an economic value of 4; and an environmental score of 4. Zeta's scores might be a social value of 1; an economic value of 5; and an environmental score of 3. Collect feedback from the groups, taking about **ten minutes** to discuss and resolve variations in answers among the groups.

Refer the students to *The SMT and TBLS* section of Appendix A. Direct the groups to calculate the Triple Bottom Line Score (TBLS) by completing the Sustainability Measurement Tool (SMT) by multiplying the Social Score x the Economic Score x the Environmental Score to calculate the Triple Bottom Line Score. The TBLS corresponds to a color code scheme, similar to a risk matrix, which describes actions for a supplier to take to maintain a relationship with the business. Groups should identify the color scheme once the TBLS is calculated. This activity should take no more than **five minutes** to complete.

Collect and discuss feedback for about **fifteen minutes**. Gamma's TBLS should be close to 80 and coded as green. Zeta's TBLS should be close to 15 and coded as light red. The key takeaway is that although both suppliers were notable when sustainability was not considered, the supplier qualification and monitoring is now much more nuanced as it is clear that Zeta poses various challenges to the business that Gamma does not. Thus, Gamma may have more relaxed monitoring, while Zeta appears to require significant intervention. Further, students should be able to identify the differences between the two suppliers and how the tool allows them to focus on the specific dimension that is weak.

## SUMMATION: INSTRUCTOR WRAP UP OF THE EXERCISE

For the remaining time, at the end of the second class session, the instructor could engage the students in determining their key take-aways. One way to accomplish this task is to have students participate in a live poll where all students can see the results, perhaps by Google poll, or even a shared document. The question posed could be “In your opinion, what are the very top factors--perhaps two or three-- an organization should consider when selecting and monitoring a tier 1 supplier?”

The instructor will then wrap up the session by synthesizing students’ answers, using those answers to support: 1) how SMEs typically select tier 1 suppliers based on the traditional supplier selection methods, and 2) how sustainability is an emerging factor in supplier management. It is likely the student responses will illustrate a blend of those factors. Finally, the instructor will reiterate how tier 1 supplier selection can vary if a company considers suppliers’ sustainability policies and practices as well as risks and costs while the instructor keeps in mind the outcome of in-class exercises for the students.

## CONCLUSION

This classroom exercise demonstrates the significant role sustainability plays in supplier qualification and monitoring, especially for Small and Medium Enterprises (SMEs). By incorporating sustainability dimensions into traditional tools, such as the Kraljic Matrix and the Factor Rating Method, organizations such as SMEs can take a more holistic approach to supplier management which allows for a more targeted approach to qualification and monitoring. The newly developed Sustainability Measurement Tool (SMT) enables a deeper understanding of a supplier's environmental, social, and economic impacts, offering students valuable insights into how considering sustainability in supplier management can reveal risks and opportunities not typically captured by cost and performance alone.

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## Appendix A: In-Class Handout

### Class Session 1

Read the below paragraph about XYZ Industries. Then take a hard look at their suppliers, which are numbered 1–6. Considering the data for those suppliers, evaluate the matrix on the following page. Taking your best GUESS, where would you place these suppliers?

A thriving manufacturing company, XYZ Industries, relies on at least six tier 1 suppliers to maintain its production operations. Tier 1 suppliers are those suppliers that work directly with an organization to provide materials and services. These suppliers provide crucial materials and services necessary for XYZ Industries to meet customer demand. The company’s procurement team has assessed the risk associated with each supplier based on three key factors: access to infrastructure, sole supplier status, and indispensability to the business.

#### **Tier 1 Suppliers:**

<b>1. Alpha Materials Inc.</b>
Access to Infrastructure: High—Both physical and digital
Indispensability: Low (product types can be substituted)
Sole Supplier: No
Cost to Business: \$3 million annually
<b>2. Beta Electronics</b>
Access to Infrastructure: Low—Delivery only
Indispensability: High (no product type substitute)
Sole Supplier: No
Cost to Business: \$5 million annually
<b>3. Gamma Steelworks</b>
Access to Infrastructure: Low—Delivery only
Indispensability: High (no product type substitute)
Sole Supplier: Yes
Cost to Business: \$7 million annually
<b>4. Delta Plastics</b>
Access to Infrastructure: High—Both physical and digital
Indispensability: Low (product types can substitute)
Sole Supplier: No
Cost to Business: \$2 million annually
<b>5. Epsilon Circuitry</b>
Access to Infrastructure: High—Both physical and digital
Indispensability: High (no product type substitute)
Sole Supplier: No
Cost to Business: \$4 million annually
<b>6. Zeta Motors</b>
Access to Infrastructure: Low—Delivery only
Indispensability: High (no product type substitute)
Sole Supplier: Yes
Cost to Business: \$6 million annually

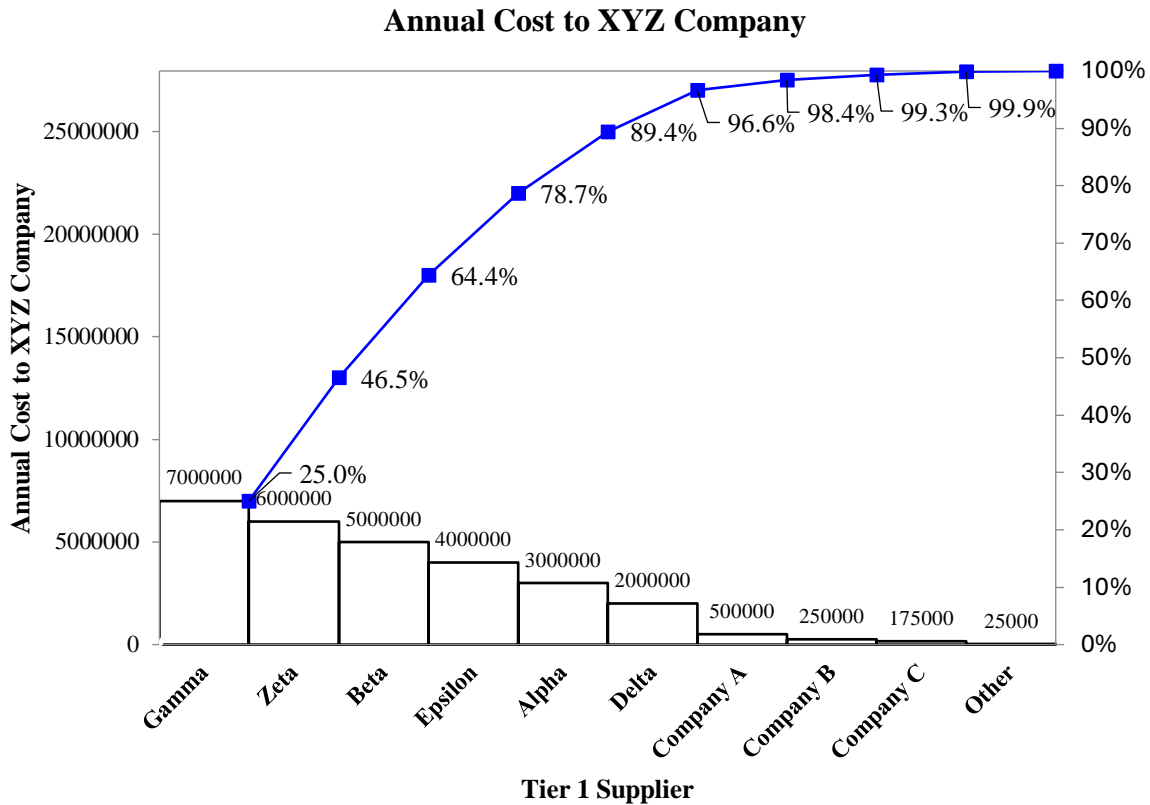


***Kraljic Matrix (expand to full page for class handout, including blank space in each matrix cell for writing):***

<p><b>HIGHER RISK</b></p>	<p><b>SECURITY Tier 1 Suppliers</b></p> <ul style="list-style-type: none"> <li>● Long-term partnerships</li> <li>● High risk, but lower cost</li> </ul>	<p><b>CRITICAL Tier 1 Suppliers</b></p> <ul style="list-style-type: none"> <li>● Long-term partnerships, usually risk comes from very few suppliers</li> <li>● High risk, high profit impact</li> </ul>
<p><b>LOWER RISK</b></p>	<p><b>ACQUISITION Tier 1 Suppliers</b></p> <ul style="list-style-type: none"> <li>● Short-term partnerships</li> <li>● Low risk, low cost</li> </ul>	<p><b>PROFIT Tier 1 Suppliers</b></p> <ul style="list-style-type: none"> <li>● Short-term partnerships</li> <li>● Low risk, but high cost</li> </ul>
	<p><b>LOWER COST</b></p>	<p><b>HIGHER COST</b></p>

STOP HERE AND WAIT FOR YOUR INSTRUCTOR.

Pareto Analysis and ABC Costs:



Which are Costs A? Which are Costs B? Which are Costs C?

Factor Rating Method for Risk Analysis

Calculate the weighted risk score for each supplier based on the three risk factors (access to infrastructure, sole supplier status, and indispensability) using the following weights:

Access to Infrastructure: 20%      Sole Supplier Status: 40%      Indispensability: 40%

1 = Very Low Risk                      2 = Low Risk                      3 = Average Risk  
 4 = Moderate Risk                      5 = High Risk

Company	Access Weight (0.2)	Access to Infrastructure	Access Score	Indispensability Weight (0.4)	Indispensability	Indispensability Score	Sole Supplier Weight (0.4)	Sole Supplier	Sole Supplier Score	Total
Alpha	0.2	5	1	0.4	1	0.4	0.4	1	0.4	1.8
Beta	0.2	1	0.2	0.4	5	2	0.4	1	0.4	2.6
Gamma	0.2	1	0.2	0.4	5	2	0.4	5	2	4.2
Delta	0.2	5	1	0.4	1	0.4	0.4	1	0.4	1.8
Epsilon	0.2	5	1	0.4	5	2	0.4	1	0.4	3.4
Zeta	0.2	1	0.2	0.4	5	2	0.4	5	2	4.2

Where do we focus--which tier 1s are the highest risk?

## *Class Session 2*

### **Triple Bottom Line Scales (Rubrics) Evaluation Tool**

**These scales have been developed to address various levels of achievement for a supplier in terms of the Triple Bottom Line of People, Profit, and Planet, also known as Social, Economic, and Environmental.**

#### **Social Scale**

*Poor (1):* No formal policy or initiatives concerning Diversity, Equity, & Inclusion (DEI). Wages paid are below the market consistently across positions held. No policies to ensure avoidance of criminal labor practices, especially human trafficking and child labor.

*Below Average (2):* DEI policy exists, but no effective initiatives are noted. Some, but not all, positions are paid below the market. Formal policies to ensure avoidance of criminal labor practices, especially human trafficking and child labor, exist, but are not routinely monitored.

*Average (3):* DEI policy exists and some effective initiatives are in place. Consistent market wages are paid. Formal policies to ensure avoidance of criminal labor practices, especially human trafficking and child labor, exist and are routinely monitored.

*Good (4):* DEI policies exist with effective initiatives and ongoing planning for more initiatives. Consistent market wages are paid, and the market is routinely evaluated to ensure market rates are met. Formal policies to ensure avoidance of criminal labor practices, especially human trafficking and child labor exist, and are routinely monitored and updated. Routine evaluation of prioritized Tier 1 suppliers implemented.

*Excellent (5):* DEI policies exist with comprehensive initiatives driven by strategic plans. Consistent above-market wages are paid, and the market is routinely evaluated to ensure market rates are exceeded. Formal policies to ensure avoidance of criminal labor practices exist and are routinely monitored and updated. Contingency plans exist to address exogenous conditions for pandemics, social instability, and demographic challenges/aging population. Routine evaluation of prioritized Tier 1 suppliers implemented.

#### **Economic Scale**

*Poor (1):* Supplier consistently operates with an average profit margin below the industry norm and demonstrates a negative profit margin at times within the monitoring period.

*Below Average (2):* Supplier's average profit margin is below the industry norm; no evidence of negative margins during the monitoring period.

*Average (3):* Supplier maintains average profit margins that are consistent with (at or near) its industry norm during the monitoring period.

*Good (4):* Supplier maintains healthy profit margins that exceed industry norms during the monitoring period. Routine evaluation of prioritized Tier 1 suppliers implemented.

*Excellent (5):* Supplier maintains healthy profit margins that exceed industry norms during the monitoring period. Contingency plans exist to address or consider exogenous conditions for financial crises, boycotts, litigation, and market disruption. Routine evaluation of prioritized Tier 1 suppliers implemented.

#### **Environmental Scale**

*Poor (1):* No consideration of GHG emissions and/or water usage; and/or a history of environmental regulation non-compliance (greater than one instance) within the monitoring period.

*Below Average (2):* GHG emissions and/or water usage is known but no plan or commitment to reduction efforts; and/or one instance of environmental regulation non-compliance within the monitoring period.

*Average (3):* GHG emissions and/or water usage is known with stated plan/commitment to reduction with limited efforts. No instances of environmental regulation non-compliance within the monitoring period.

*Good (4):* GHG emissions and/or water usage reduction efforts encoded as part of planning and resulted in decreases during the monitoring period. No instances of environmental regulation non-compliance within the monitoring period. Routine evaluation of prioritized Tier 1 suppliers implemented.

*Excellent (5):* GHG emissions and/or water usage reduction efforts encoded as part of planning and resulted in decreases during the monitoring period. No instances of environmental regulation non-compliance within the monitoring period. Contingency planning exists for natural disasters and severe weather. Routine evaluation of prioritized Tier 1 suppliers implemented.

## **Two Companies...What Are Their Triple Bottom Line Scores?**

**GAMMA COMPANY:** a niche steel manufacturer specializing in pressed steel for specific industries.

**SOCIAL:** Gamma Company offers a safe working environment with fair wages across all positions. During the monitoring period, it implemented a DEI initiative as a pay equity analysis. Gamma Company monitors its labor practices for legality, and such actions are documented in policies. Its contingency plans address pandemics, social instability (such as political problems and wars), and demographic concerns. It engages in Tier 1 supplier sustainability evaluation. **What is the social score?**

**ECONOMIC:** Gamma Company's focus on niche markets allows for stability even in fluctuating economic conditions. Its commitment to quality and innovation ensures a steady demand for its specialized steel products. As a result, it maintains an average net profit margin of 15.7% as compared to the industry average of 14.7%. It engages in Tier 1 supplier sustainability evaluation. **What is the economic score?**

**ENVIRONMENTAL:** Gamma Company has heavily invested in advanced technologies to minimize carbon emissions during steel production. It has implemented energy-efficient equipment and adopted cleaner energy sources to reduce its environmental footprint as part of its strategic plan and has achieved a decrease in emissions during this monitoring period. Gamma is compliant with environmental regulations. Its contingency plans do not address natural disasters or other sources of severe weather. It engages in Tier 1 supplier sustainability evaluation. **What is the environmental score?**

**Gamma Triple Bottom Line Score:**

**ZETA COMPANY:** specializing in circuitry production for various growing industries.

**SOCIAL:** Zeta Company is actively working to foster a more inclusive workplace, promoting diversity among its employees, and ensuring equal opportunities for all through planning. Its commitment to wage equity is represented by its plan to close pervasive wage gaps. No policies exist for DEI management or legal labor assurance. **What is the social score?**

**ECONOMIC:** Zeta enjoys an average profit margin of 10%, over the current 6% average for the industry. It has developed comprehensive contingency plans for external conditions, such as financial crises, boycotts, litigation, and market disruption. **What is the economic score?**

**ENVIRONMENTAL:** Zeta recognizes the imperative of reducing emissions and minimizing its carbon footprint. It has embarked on a comprehensive emissions reduction program, investing in cutting-edge technology and operational improvements to make its manufacturing processes more eco-friendly this year. To date, no reduction in GHGs is known. **What is the environmental score?**

**Zeta Triple Bottom Line Score:**

***The SMT and TBLs:***

<b>Company</b>	<b>Social</b>	<b>Economic</b>	<b>Environmental</b>	<b>TBLs</b>	<b>Color Code</b>
<b>Gamma</b>					
<b>Zeta</b>					

Range: 80+

This supplier is good to go and should just continue to be monitored by some sort of contractual means.

Color code: Dark Green

Range: 35–79

This supplier is also a good choice; however, opportunities exist for further improvement. It could be beneficial to partner with this supplier to assist in achieving desired improvements. As with any supplier, this supplier should be monitored.

Color code: Light Green

Range: 25–34

This supplier is average. Contractual obligations for improvement should be specified and monitored.

Color code: Yellow

Range: 5–24

This supplier is questionable. Consider its current situation and its plans going forward; consider using only in difficult circumstances, such as a mono supplier, or as a back-up if necessary. If it is used, specific conditions should be applied contractually and monitored.

Color code: Light Red

Range: <5:

This supplier should be removed from the supply chain or approved supplier list. Only extreme circumstances should warrant its use, and if it is used, specific conditions should be applied and contractually monitored.

Color code: Dark Red

# Facilitating Student Learning of Spreadsheets In Cost Accounting through Instructional Scaffolding

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## ABSTRACT

Competency with technology is a critical skill for graduates of accounting programs, requiring academics to create learning experiences that prepare graduates for the workplace. Despite the emergence of many new technology tools, proficiency in spreadsheets remains a desired skill for accountants. However, today's traditional students may not possess the necessary skills in technologies like spreadsheets despite their daily use of devices such as tablets, smartphones, and laptops. Covering both traditional accounting topics and technology in limited class time seems to be a challenging task. However, the research by Vygotskian and the use of scaffolding suggests that well-designed guidance and assistance may make a difference in the student's ultimate success. Scaffolding, well-established in the education literature, stresses that educators must be attentive to and understand their students' skill set at the beginning of a course, as this understanding is crucial for planning practical learning activities. This paper's purpose is to describe the use of scaffolding strategies in a face-to-face undergraduate course assignment combining spreadsheets and a traditional cost accounting task.

**Keywords:** Instructional Scaffolding; Spreadsheets, Technological Competency

## INTRODUCTION

Competency with technology is a critical skill for graduates of business programs. As technology plays a more significant role in the accounting workplace, the accounting curriculum needs to change to reflect the skills and competencies employers expect of graduates. It is not enough to know accounting. Students need to see how practicing accountants use technology through coursework that reflects the real world.(Byrant, 2019). Recognizing the disconnect between a traditional course of study in accounting and employers' expectations, AACSB International challenged the academic community to keep up with the times. To earn and maintain accounting accreditation, the AACSB International (2018) states that "...accounting degree programs (need to) include learning experiences that develop skills and knowledge related to the integration of information technology in accounting and business" p.22.

Similarly, the accounting profession, aware of the profound impact of technology on the accountant's role, has embarked on a journey of transformation. This journey is further fueled by the ever-expanding body of tax, audit, and financial reporting knowledge. The result of this effort is a comprehensive overhaul of the Uniform CPA Exam (NASBA & AICPA, 2024; Tysiac, 2020). The CPA Evolution project, spearheaded by the NASBA and AICPA, has fundamentally reshaped the uniform CPA exam, now demanding a significantly higher level of technology competency.

In spite of the availability of new software tools, spreadsheet skills continue to be highly valued by employers (Rebman et al., 2023; Church et al., 2022). Proficiency in spreadsheets is a crucial first step toward mastering data analytics (Mount, 2024; Satta & Ross, 2022-2023; Mount, 2021). Spreadsheet competency "... provides the opportunity to learn the fundamentals of data analytics without the need to learn a new programming language at the same time. This greatly reduces cognitive overhead."(Mount, 2021, p 9).

Today's traditional students, often referred to as digital natives (Prensky 2001), may not possess the necessary skills in technologies like spreadsheets despite their daily use of devices such as tablets, smartphones, and laptops. Supiano (2019 B10) warns educators "...that there is a difference between familiarity and understanding". A recent study further highlights this observation and found that students often overestimate their spreadsheet competencies. To prepare their students for the demands of the professional world, educators must be attentive to and understand their students' spreadsheet competency at the beginning of a course, as this understanding is crucial for planning practical and meaningful learning activities.

This paper discusses experiences using instructional scaffolding, a collection of valuable teaching strategies, to infuse spreadsheet skills into a traditional cost accounting task. The paper describes seven scaffolding strategies applied to a sales variance analysis assignment and includes observations about the experience.

## **BACKGROUND OF THE ASSIGNMENT**

The assignment described in this paper was a spreadsheet project graded in undergraduate cost accounting, a course required for accounting majors and accounting minors. The course was face-to-face with two weekly daytime sessions over a fifteen-week semester. The prerequisites included the two accounting principles courses, one in financial accounting and one in managerial accounting. Although the students had some previous exposure to spreadsheets, most could only complete simple tasks without assistance. The project, with both group and individual components, was assigned mid-way through the semester after the students had gained experience with computing standard cost variances.

As shown in Table 1, the project had four required learning deliverables. The students had first to be aware that real data sets have errors. Next, in terms of accounting knowledge, the students needed to switch their mindset from cost variances to sales variances. As such, they needed to know how to compute sales price and volume variances. The third deliverable required students to translate the manual computations into spreadsheets. To succeed, students need to go beyond awareness of data quality and be able to recognize and correct errors in the data. Once students had completed data cleansing, they needed to use the formulas correctly. The final required deliverable was a presentation of the group's results and personal reflections by individual team members.

### **Table 1 Sales Variance Assignment**

The objective of assignment is to analyze sales trends for a company selling two categories of product across five locations across the United States. The successful student will be able to:

1. Be aware data quantity issues with real datasets.
2. Compute sales price and sales volume variances. given:
  - a. Two products categories
  - b. Multiple locations.
3. Translate the manual variance computations to a spreadsheet.
  - a. Recognize and correct errors in the data set.
  - b. Correctly use Excel formulas and Functions
4. Self-reflect and communicate experiences to others in the class.

## **SCAFFOLDING BACKGROUND**

The theoretical underpinning for instructional scaffolding can be traced back to Lev Vygotsky's (1978) perspective on learning. Vygotsky's philosophy is that educators need to recognize the benefit of social interaction between a novice and a more experienced individual. Through social interaction, the interplay between the learner and a knowledgeable person, the learner has the possibility of greater accomplishment.

Vygotsky's approach classifies tasks in terms of the extent to which the learner needs help for success. For example, tasks that are impossible for the learner to complete may become attainable given assistance. Tasks that are attainable with assistance represent the Zone of Proximal Development (ZPD) based on Vygotsky's theory. Accordingly, design of learning experiences should focus on the ZPD because that is where learning can be enhanced. Similarly, Rosenshine & Meister state that scaffolding needs to "...bridge the gap between their current abilities and the intended goal." (1992, p.9). Vygotsky also notes that there are tasks that cannot be completed regardless of assistance. The implication is that educators need to be aware of their students' current competencies and carefully match scaffolding strategies to student needs. Without an accurate understanding of base line skill and knowledge, learning could be targeted at too low a level wasting time and risking the loss of students interest. Alternatively, starting a level that is beyond student capabilities even with assistance would be quite problematic.

Interestingly, Vygotsky did not explicitly mention scaffolding in his work, but his theory helped pave the way. The coining of the phrase scaffolding and its description came from the work of Wood, Bruner, and Ross (1976) on tutoring.



Published in the Journal of Child Psychology and Psychiatry, the article reported how young children respond to various forms of assistance in completing tasks. Rather than focus primarily on task performance when the child is unaided, the authors suggest looking at what the child can do with help. The paper states that instructional scaffolding "... enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts." (Wood et al., p.90). In this context, scaffolding is analogous to the function of scaffolding in construction. It is a temporary aid. The intended result of scaffolding is that the learner will be able to complete the task or problem independently. In the decades since Wood et al. introduced the concept, scaffolding strategies have been used in numerous settings including college age and adult students. (Sun et al., 2023; Kaden et al., 2021; Doo et al., 2020; Taber, 2018; Belland, 2014, 2017; van de Pol et al., 2010, 2015; Claar & Finn, 2011; Philips & Heiser, 2011; Blackburn, 2008; Azevedo et al., 2004; Davis & Miyake, 2004)

**Scaffolding Strategies** The crucial first step involves getting an appreciation of students' base knowledge and skill level in both accounting and technology. Early in the semester, students complete a quiz online. The quiz asks about their experiences with technology. In particular, they are asked to take a broad view of technology including devices they use personally, for class or business. The quiz asks about the ways that they enjoy technology and the ways they find technology annoying. Typically, the next class starts with a discussion and review of the quiz which provides helpful information for teacher and students. The results of the quiz combined with class discussion provide insight about base knowledge level. Then the design of the scaffolding procedures begins. The accounting knowledge required for the project relates to sales variance analysis. The class has already had exposure to cost variance analysis with tools including graphic aids, practice problems and check figures. The student are encouraged to know how to reproduce the cost graphic aid by themselves. Table 2 shows scaffolding strategies employed for this project. The scaffolds include: Warmups, peer-to-peer interactions, graphic aids, peer coaching, in-class demonstrations, videos, and check figures.

*Warmups:* At the start of class, the student individually completes a pencil and paper discussion question related to the specific concept or skill scheduled for that class. The purpose of this scaffolding strategy is to encourage students to come to class on time and prepared while providing the groundwork for the material to be covered that day. For example, to stimulate awareness of data quality issues, the discussion question asked students to identify the errors they think accountants find in the data sets they need to access and analyze. Another discussion question asks the student to compute variances for a simple one-product scenario. Grading of the warmup is based on effort. Typically, completion of the discussion question takes five minutes or less. As such, these questions are low-stakes assignments that lead to the topic covered that day during class.

**Table 2 Scaffolding Strategies and Project Deliverables**

<b>Project Deliverables</b>	<b>Strategies</b>
Awareness that real datasets can have data quality issues	Warm-ups Peer-to-Peer Interaction
Compute sales price and sales volume variances.	Warm-ups Peer-to-Peer Interaction Graphic Aid
Translate the manual variance computations to a spreadsheet.	Peer Coaching In class demonstration Videos and script with screenshots Check figures
Communicate self-reflection to others in the class.	Peer-to-Peer interaction

*Peer-to-Peer discussion:* In small groups, students revisit the discussion question and collaborate on a response soliciting input from all group members. The group discussion gives individuals who are uncomfortable speaking in front of a group some practice in expressing their thoughts. The peer-to-peer strategy also allows students to get feedback while stimulating further consideration of the issues under review. For example, for computational questions,

like variances, students compare answers and try to reach a consensus on the solution. For the data quality question, student review and combine their lists of data errors. Immediately afterward, a class session follows. Students are encouraged to take a picture of their discussion question responses at the end of class and hand in their hard copies.

*Graphic Aid:* A graphic aid, a template, guides the student through the steps involved in calculating the sales variances. Initially, the template includes the actual formulas needed to compute the variances. The template uses the same format for the formulas shown in the text to avoid confusion when students compare the text to the template. Students continue to practice using the template, and, eventually, are expected to be able to reproduce it and compute the variances independently.

*Peer coaching:* Student volunteers provide assistance and coaching for the spreadsheets assignments. Peer coaching can potentially encourage greater student interaction while stimulating greater engagement with the material. The student volunteers are members of the class.

*In-class demonstration:* The in-class demonstration includes all the steps involved in translating the manual variance computations to spreadsheets using a tutorial dataset. The steps start with cleansing the dataset, followed by all the steps needed to compute sales price and volume variances. The tutorial dataset is a scaled-down, 24-transaction version of the full dataset, embedded with errors similar to those found in the full data set.

*Video:* The video along with screenshots shows all the steps that were also shown in class. Students access the videos through the Learning Management System.

*Check figures:* The graded assignment is based on working with a full data set. Check figures allow students to compare some of the key results to the correct solution.

**Observations about Scaffolding.** The project, with different data sets, was a graded assignment over four semesters with greater use of scaffolding in two of the four. In the semesters with less scaffolding, students could complete the analysis but needed a lot more assistance. In those semesters, students needed help almost to the project's due date. So, in terms of completing the project on time and accurately, scaffolding seemed effective for the two semesters with the most scaffolding. The emphasis on peer-to-peer discussion also had a positive effect. The same students who expressed concerns about speaking in front of the whole class seemed more at ease by the end of the semester. The practice of speaking in front of a small group seemed to transfer to overall comfort with presenting to the whole class. The students were fairly homogeneous in terms of base skill level across the four semesters.

The most frequent comment about the project concerned the availability of the video and screenshots. Students stated that listening and watching the in-class demonstration gave them an appreciation of the project's scope. However, "real learning" occurred when they worked independently with the tutorial dataset. Watching the video while working with the small, 24-record dataset allowed students to visualize the project and "play with the numbers" to see how the formulas worked. Students also seemed to appreciate the check figures. When the assignment was first announced, some students expressed concern about their ability to complete the project. Others were concerned about having to present to the whole class. The personal reflections at the end of the project were like a debriefing. Based on comments at that point and afterward, the check figures combined with the video and screenshots gave most students confidence in their ability to successfully navigate the project and complete it correctly and on time.

In terms of peer-to-peer interactions, students said that they found it easier to ask their question to a peer rather than bring up the same question in front of the whole class. As a graphic aid, the template helped students understand the computations. Based on observations during exams, experience with the template helped students answer variance questions correctly. Students mentioned that they appreciated the warmup assignments because they set the stage for the rest of the class while clarifying the rationale behind the participation grade. Their positive feedback on these assignments underscores the value of the warmups in engaging students. Finally, the initial quiz and questions about technology provided some interesting results—one of the most common technology complaints related to the difficulty using MAC products for some assignments.

## CONCLUSIONS

In the 1970s, when Wood, Bruner, and Ross (1976) coined the term scaffolding, the focus was on designing effective learning experiences for children. Today, these strategies are applied across various disciplines, course formats, and

learners. This paper aims to describe the use of scaffolding strategies in a face-to-face undergraduate course. Scaffolding provided the means to infuse technology into a traditional cost accounting topic, sales variance analysis. The limitation of this paper, however, is that it describes one instructor's experience. Yet, there are some lessons learned. Scaffolding adequately planned and executed is a valuable learning approach. Although rewarding, the process is time-consuming. A clear understanding of the student's background and their goals is imperative. Vygotsky's ideas about the sociocultural aspect of learning and the importance of the interplay between the learner and the knowledgeable person are as relevant today as they were decades ago.

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# Empowering Students Through Optimism: A Pathway to Better Mental Health and Academic Achievement

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## ABSTRACT

Despite significant improvements in quality of life across the globe, business students are struggling with mental health issues at unprecedented rates. This paper examines how students respond to potentially threatening situations and offers practical strategies that business educators can use to enhance student well-being and academic success. By integrating research on state-like optimism with the transactional model of stress and coping (Lazarus and Folkman, 1984), I attempt to demonstrate how educators can teach students to reframe adverse situations as challenges rather than threats. This reframing can modulate students' stress responses, foster resilience, and lead to more favorable academic and professional outcomes. By equipping students with these skills, business educators can play a pivotal role in improving student well-being and preparing them for the complexities of the modern workplace.

**Keywords:** Optimism, Threat Appraisal, Stress, Anxiety, Depression

## INTRODUCTION

Living conditions have shown marked improvements over the last century, yet college students are struggling with mental health issues at unprecedented rates. For example, in a study of 787,000 undergraduate students, it was found that 41.1% were suffering from moderate to severe depression in 2019, up from 23.2% in 2007 (Duffy, Twenge, & Joiner, 2019). This comes at a time when more people have access to clean water, food, electricity, and healthcare than ever before. For instance, in 1950, nearly three quarters of the world's population lived in extreme poverty. Based on recent data from The World Bank, that number is now less than 10% (Roser, 2021). Since 1990, almost 130,000 people have risen out of extreme poverty each day (Hasell et al., 2022). According to the National Center for Education Statistics, literacy rates have climbed from almost 33% in 1930 to around 85% today. Healthcare has also seen remarkable advancements over the past century. As a result, life expectancy worldwide has increased from approximately 31 years in the early 1900s to over 72 years by 2019 (Roser, Ortiz-Ospina, & Ritchie, 2019). Therefore, it is possible that it is not objective circumstances that determine the well-being and overall health of college students, but the way in which they respond to their circumstances.

Although the topic of mental health has generally received little attention in the context of business education, it is of vital importance to the lives and careers of business students. For example, a recent Gallup poll found that 19% of U.S. workers were miserable and as much as 60% of people reported being emotionally detached at work. Only 33% reported feeling engaged, which represents a significant downturn from 2020 (Gallup, 2022). Although these numbers represent the grim state of work in the U.S., it also represents an opportunity for business educators to provide students with the tools they need to improve their wellbeing and find a meaningful, engaging profession.

Educational institutions are uniquely positioned to address the mental health needs of their students. As centers of both learning and socialization, they can provide a supportive environment that promotes resilience and emotional well-being. Business educators, in particular, have a critical role to play by equipping students with practical tools to manage stress and cultivate optimism. By incorporating strategies that foster emotional intelligence, self-awareness, and positive thinking, educators can help students not only survive but thrive in both their academic pursuits and future careers.

In this endeavor, I draw from scholarship on optimism to uncover practical strategies that business educators can use to help students deal with adversity and stress. Specifically, I posit that educators can help students to modulate their responses to potentially threatening events by reframing the way they view them. In the following sections, I will examine previous research on optimism, define the two main types of optimism, and discuss ways that educators can incorporate this research into business curricula. I conclude by discussing the practical implications of incorporating research on optimism into business education and highlighting the impact of doing so on student success.

## PREVIOUS RESEARCH

There is an ancient Chinese parable about a farmer who lost his horse. Afterward, his neighbors came by to offer their condolences. They said, "We're so sorry to hear about your horse; that's too bad." The farmer replied, "Maybe."

The next day, the horse returned, bringing along seven wild horses. The neighbors came back, exclaiming, "Oh, how wonderful!" Again, the farmer replied, "Maybe."

The following day, the farmer's son was thrown off one of the wild horses and broke his leg. The neighbors came by once more and said, "We're so sorry about your son. What a tragedy." The farmer replied, "Maybe."

The next morning, officers arrived to conscript the farmer's son into the army, but upon seeing his broken leg, they left without him. "Isn't that terrific?" the neighbors said. The farmer replied, "Maybe."

This story tells us what has only recently become apparent in the literature on optimism and mental health: "It appears that the way people perceive the world is much more important to happiness than objective circumstances" (Diener, Lucas, & Oishi, 2002, p.68). Similarly, Emerson wrote "To the different minds, the same world is a hell, and a heaven" and Shakespeare said, "Nothing is good or bad, but thinking makes it so." We have no way of knowing exactly what the future holds, yet we often think the worst when the unexpected happens. There are several reasons for this: First, our brains process bad events more thoroughly because they might resemble a threat, whereas positive and neutral events present no immediate danger (Baumeister et al., 2001). Another reason is that we tend to overestimate the impact of life events. When something seemingly good or bad occurs, we often think that it is going to impact us much more intensely and for a longer duration than it does.

Just as the farmer and the neighbors had differing viewpoints, people display a wide range of responses to life events. Some are more pessimistic, believing that the worst will happen, which leads them to ruminate more, feel less control over their lives, and show less resilience. Pessimists are nearly twice as likely to experience depression compared to their more optimistic peers and are more likely to have weaker immune systems, higher blood pressure, and an increased risk of heart attack (Seligman, 2018).

Conversely, optimists tend to focus on the positives in life and are less likely to give up when faced with challenges. To an optimist, setbacks are seen as temporary and specific to a single event rather than indicative of an overall trend. They are more likely to view new situations as challenges rather than threats. As a result, optimists are better able to persist through difficulties and often experience better health and longer lifespans. For instance, a 40-year study conducted by the University of North Carolina found that optimists had a significantly lower mortality rate, with the most pessimistic individuals in the sample facing a 42% higher risk of mortality compared to the most optimistic group (Brummett et al., 2006).

Fortunately, optimism levels have been shown to be somewhat malleable (Seligman, 2018). In order to become more optimistic, it is necessary to understand the difference between two types of optimism. First, state-like optimism, refers to a temporary, adaptable form of optimism that can fluctuate depending on the situation or context. Unlike trait-like optimism, which is a stable, enduring aspect of one's personality, state-like optimism is malleable and can be developed or enhanced through training, experiences, or interventions. It represents a person's optimistic outlook at a specific moment, influencing how they appraise situations—viewing challenges more positively and perceiving obstacles as opportunities or challenges, rather than threats.

As Martin Seligman wrote in his book *Learned Optimism*, "One of the most significant findings in psychology in the last twenty years is that individuals can choose the way we think" (2006, p. 30). Although students have little control over their genetically pre-determined levels of optimism, they have a great deal of control over their state-like optimism. According to Seligman, we can increase state-like or situational optimism by changing how we explain events. He suggested that our "explanatory style," or the way we interpret positive or negative events, can significantly influence our perspective. This style is shaped by three dimensions: permanence (the belief that negative events and their causes are enduring, even when there is evidence to the contrary), pervasiveness (the tendency to apply the negative aspects of one situation to others), and personalization (the habit of blaming oneself for negative outcomes).

Through his collaboration with psychologist Chris Peterson, Seligman discovered that optimists and pessimists differ in how they interpret negative events. Pessimists see bad events as permanent and unchangeable, while optimists are more likely to view them as temporary (e.g., "I didn't do well on my exam, but I'll do better next time"). Pessimists also tend to believe that negative events affect every aspect of their lives. For instance, a pessimist who fails an algebra test might think, "I'm not smart," rather than recognizing that they usually perform well in other areas. Pessimists are also more likely to blame themselves for everything that goes wrong.

This does not mean students should ignore personal responsibility when things go wrong. To overcome challenges, one must take ownership and control of their lives. However, internalizing negative events through self-blame and excessive rumination is less effective than objectively assessing a situation, recognizing what went well or could have been improved, and moving forward with a more constructive approach.

To develop an optimistic mindset, it is crucial to recognize that most events are temporary (e.g., just because you feel a certain way now does not mean you will feel that way forever), they do not have to apply universally (e.g., "Yes, I failed this test, but it doesn't mean I'm a failure"), and they should not be overly personalized (i.e., students should take responsibility for what they can change and avoid blaming themselves for things beyond their control).

Optimism is particularly important in business education because it influences how individuals behave when facing potentially stressful situations. Since the 1960s, Martin Seligman has conducted experiments on animals—including dogs, rats, mice, and cockroaches—as well as humans to determine why some people persist while others give up. In a 1975 study with Donald Hiroto, participants were randomly divided into three groups. The first group was exposed to an annoying loud noise that they could stop by pressing a button in front of them. The second group heard the same noise but couldn't turn it off, no matter how many times they pressed the button. The third group, serving as a control, heard nothing at all. The following day, all participants faced a different situation involving noise, but this time they could stop it simply by moving their hand 12 inches. Participants in the first and third groups quickly stopped the noise, but most of those in the second group gave up and did nothing. They had learned from previous experience that no matter how hard they tried, they wouldn't achieve the desired outcome. As a result, they stopped trying.

This idea that people learn to become helpless was interesting, but what was most surprising was that not everyone in the second group gave up. Whether it be dogs, rats, or humans, about a third of the second group never stopped trying. They persisted in the face of insurmountable odds. In a Harvard Business Review article entitled "Building Resilience," Seligman said that the answer to why some persisted while others quit was optimism. He stated that he discovered that people who don't give up have a habit of interpreting setbacks as temporary, local, and changeable (e.g., "It's going away quickly; it's just this one situation, and I can do something about it"). Seligman argued that we can teach people to think like optimists and, as a result, we might immunize people against learned helplessness, depression, and anxiety.

Seligman and his colleague applied their findings to MetLife, a company struggling to hire and retain insurance salespeople. Insurance sales is heavily commission-based, so if agents do not meet their sales targets, they face significant financial challenges. Consequently, the job has one of the highest turnover rates. At MetLife, turnover was particularly high—50% within the first year and 80% by the fourth year—making it one of the highest in the industry. Seligman suspected that the nature of the work and the stress it entailed required individuals who were especially optimistic and resilient. He developed a new test that incorporated measurements of optimism. He found that those who passed both the traditional aptitude test and the optimism test performed eight percent better in their first year and 31% better in their second year than those who only passed the aptitude test. Based on these results, Seligman convinced MetLife to hire a group of "super-optimists" who scored extremely high on the optimism test but failed the aptitude test. Compared to pessimists in the study who passed the aptitude test, this group performed 57% better in their second year and had significantly lower turnover rates (Seligman & Schulman, 1986).

Despite the apparent benefits of optimism, it is important to note that pessimism has some value. Shaped by evolution, we have become naturally inclined toward pessimism because it is the safest option for survival. For instance, imagine someone is about to walk by a bush where a lion might be hiding. It would be wise to assume there is a lion rather than stroll by only to find it waiting for its next meal. In other words, when the consequences of making a choice are highly consequential, it makes sense to trade some of the long-term benefits of optimism for the immediate safety that pessimism can provide. However, the brain that survived through thousands of years of ice age, drought, war, and famine is one that is prone to see threats in the world even when they are not there. Although

this was extremely beneficial when one was constantly confronted with life-or-death decisions, it has left people more vulnerable to the profusion of negativity that they encounter on a daily basis. To borrow from a Roman philosopher named Seneca, this causes people to suffer more often in imagination than reality.

Most people no longer live in fear of lion attacks, droughts, or famines. However, many still experience a general sense of fear and anxiety. According to The National Alliance on Mental Illness, over 40 million people in the U.S. are dealing with an anxiety disorder, and more than 16 million will experience depression at some point in their lives. Our brains, which have evolved to ensure our survival, may now be hindering our ability to thrive. Fortunately, optimism has a tremendous capacity to influence the way in which we appraise situations and ultimately our mental health.

### **Optimism and Mental Health**

The connection between optimism and mental health is well-documented in psychological research. Optimism, particularly state-like optimism, plays a crucial role in influencing an individual's mental well-being. Understanding this relationship is essential for business educators who aim to enhance their students' ability to cope with stress and improve overall mental health.

Optimism serves as a protective factor against mental health issues such as depression and anxiety. Individuals with higher levels of optimism are more likely to employ adaptive coping strategies when faced with stressors, reducing the likelihood of developing mental health disorders (Carver & Scheier, 2017). Optimists tend to focus on positive outcomes and view challenges as opportunities for growth, which can buffer the negative effects of stress.

Beyond psychological advantages, optimism is associated with better physical health outcomes, which are indirectly linked to mental health. Optimistic individuals often have stronger immune responses, lower levels of inflammation, and better cardiovascular health (Rasmussen, Scheier, & Greenhouse, 2009). These physiological benefits can contribute to improved mood and decreased symptoms of mental health disorders.

Optimism also influences the way individuals appraise and respond to stressful situations. According to the transactional model of stress and coping (Lazarus & Folkman, 1984), the appraisal of a stressor as a challenge rather than a threat can lead to more effective coping strategies. Optimists are more likely to make such appraisals, which facilitates emotional regulation and reduces the impact of stress on mental health (Tugade & Fredrickson, 2004).

For business students, mental health significantly affects academic performance and professional development. High stress levels and poor mental health can impair concentration, memory, and decision-making abilities. Optimism can mitigate these effects by enhancing resilience and promoting a positive mindset, leading to better academic outcomes (Chemers, Hu, & Garcia, 2001).

Teaching students how to become more optimistic is not only beneficial for their mental health but also for their future career success. Research shows that optimism correlates with higher job satisfaction, better workplace relationships, and greater resilience in the face of job-related challenges (Scheier & Carver, 2018). By learning to approach problems with a positive mindset, students are more likely to persist through difficulties, adapt to changing circumstances, and innovate in the face of obstacles.

### **Theoretical Framework**

The transactional model of stress and coping (Lazarus & Folkman, 1984) is the predominant model used to explain how people appraise situations and represents more than four decades of scholarly development (e.g., Lazarus & Alfert, 1964; Lazarus, Opton, Nomikos, & Ramkin, 1965). This model proposes that individuals engage in a cognitive-emotional process of evaluating stimuli as either a threat or a challenge and, based on available resources, assess their ability to cope with the stressor. The subsequent coping strategy can result in vastly different responses depending on how the stimulus is perceived.

This model is particularly relevant to business education because personal resources play a crucial role in determining how students appraise potential threats. These resources encompass a range of factors, including psychological, social, and financial. Research has shown that, when faced with adversity, people draw from personal resources to protect themselves and avoid future losses (Hobfoll, 1989).

The extent to which negative events, such as a failing an exam, cause harm depends on how well students can utilize

their resources. Effectively deploying these resources during challenging circumstances, such as seeing the good in potentially bad situations, has a direct impact on coping and adaptation. Generally speaking, the more resources students develop, the more likely they will be to feel their resources outweigh the demands being placed on them. Subsequently, they will be more likely to appraise situations as challenges rather than threats. This is due, in large part, to their ability to reframe potentially threatening situations as something that can be overcome. Based on the research discussed herein, state-like optimism may be one of the most important resources one can develop to cultivate more positive appraisals of situations.

In the following section, I discuss three common ways to enhance state-like optimism. Although there are myriad ways to modulate optimism levels, meta-analytic evidence suggests that practicing these psychological interventions can significantly increase optimism (Malouff & Schutte, 2017).

## **PSYCHOLOGICAL INTERVENTIONS AIMED AT ENHANCING OPTIMISM**

Since state-like optimism is malleable, it is possible to enhance it through the use of psychological interventions, which will ultimately improve important student outcomes such as mental health. Techniques such as cognitive-behavioral therapy (CBT) focus on altering negative thought patterns and promoting optimistic thinking (Beck, 2011). Mindfulness-based stress reduction (MBSR) programs also help individuals stay present and reduce rumination, increasing optimism and reducing symptoms of depression and anxiety (Keng, Smoski, & Robins, 2011). Furthermore, goal setting through a best future-self intervention has been found to significantly improve optimism levels (Carillo et al., 2019). A summary of these interventions can be found in Table 1 below.

### **Incorporating Cognitive Behavioral Therapy**

Business educators can incorporate cognitive restructuring techniques from Cognitive Behavioral Therapy (CBT) into their curricula to help students identify and challenge negative thought patterns. This involves teaching students to recognize automatic negative thoughts that arise in response to stressors, such as self-doubt, catastrophizing, or all-or-nothing thinking. Educators can introduce activities where students journal their thoughts during challenging situations and then analyze them to identify cognitive distortions.

For example, if a student thinks, "I'm terrible at finance because I didn't do well on this exam," the educator can guide them to reframe this thought by considering evidence of past successes or acknowledging that one exam does not define their abilities. By practicing this process, students learn to replace pessimistic thoughts with more balanced and optimistic ones.

In-class discussions and role-playing exercises can further reinforce these skills. Educators might present case studies where characters face setbacks and facilitate group discussions on how to reframe negative thoughts. For example, the Leadership in Crisis: Ernest Shackleton and the Epic Voyage of the Endurance case study allows students to explore how reframing extreme setbacks as opportunities for teamwork and resilience can inspire optimism and perseverance in the face of adversity. This not only enhances individual optimism but also fosters a classroom culture that supports positive thinking.

Another useful technique derives from the late American Psychologist Albert Ellis' ABC model. This involves separating (A) the problem or threat from (B) one's thoughts about the event, and (C) the consequences (i.e., emotions and behaviors) related to the event. The basic idea is that it is not life events (or activating events) that determine emotions and behaviors but the way in which one thinks about and interprets those events. Separating and examining life events in this way can help students to see irrational thoughts that may limit their ability to overcome adversity.

To accomplish this, educators can have students write down their thoughts about whatever problem or event they are facing. Then, they can ask them to identify an irrational thinking or catastrophizing and reframe their thoughts in a more positive way. For instance, instead of thinking, "I just made this huge mistake. I'm a terrible person and my life is over," they might instead say to, "Yes, I messed up, but I'm human and everyone makes mistakes. It doesn't mean I'm a bad person, and this is a temporary setback. I will learn from it and do what is needed to correct the situation." While they go through this process, they can attempt to identify a change in their emotions. This may help students recognize the impact of reframing on their emotional state, reinforcing their ability to manage stress effectively.



### **Promoting Mindfulness Practices**

Incorporating mindfulness exercises into the classroom can enhance students' awareness of their thought patterns and reduce stress. Educators can start classes with brief mindfulness sessions, such as guided meditations, deep-breathing exercises, or body scans. These practices help students center themselves, improve focus, and reduce anxiety.

Assignments can include reflective components where students practice mindfulness outside of class and report on their experiences. For instance, students might keep a mindfulness journal, noting moments when they felt stressed and how mindfulness techniques helped them cope.

Educators can also integrate mindfulness into course content by exploring its relevance in business contexts. For instance, Ernst and Young created a special program during the COVID-19 pandemic which offered access to a 12-week mindfulness-based stress reduction program and daily group counseling sessions for parents and caregivers. They found that promoting employee health enhanced engagement and job satisfaction while reducing turnover.

Discussions can also cover topics like mindful leadership, decision-making under stress, or the impact of mindfulness on organizational culture. By highlighting real-world applications, students see the practical benefits of mindfulness for their future careers.

### **Visualizing Success: The Best Future Self Exercise**

A final intervention that has been showed to significantly improve optimism (Carillo et al., 2019) involves thinking about one's future. Students can be asked to find a quiet place and spend about 20 minutes imagining themselves in a future where everything has turned out as well as possible. They have worked hard and succeeded in accomplishing their life goals—they should be directed to think of this as the realization of all their dreams. Then, they can write down what they have envisioned. For example, they might start with, "In 7 years, I am...": "an accountant," "a manager," "traveling around the world."

After completing this, they will get more specific by focusing on three domains—personal, professional, and relational—with the goal of guiding the decisions they make in the present. For each of these domains, they should think about and write down the goals, skills, and desires they would like to achieve in the future. Throughout this process, they should focus on realistic skills and manageable goals or wishes they aspire to attain. Upon completion, they should be directed to write down specific action steps to help them get closer to reaching each of these goals. Finally, they can be directed to continue to visualize themselves as having achieved these goals for at least two weeks.

By weaving these interventions throughout the curriculum, business educators create a comprehensive approach to enhancing optimism. For instance, a course might begin with mindfulness practices to set a positive tone, followed by lessons on cognitive restructuring to prepare students for tackling challenging material. Group projects can incorporate goal-setting components, and collaborative efforts build the supportive environment necessary for these practices to flourish.

Regular reflection assignments can tie these elements together, prompting students to consider how these strategies impact their learning and personal development. By explicitly connecting these practices to both academic success and mental well-being, educators reinforce the value of cultivating optimism. Educators can also draw on resources from Berkeley's Greater Good Science Center, which offers research-based tools and activities for fostering optimism, resilience, and other well-being practices that complement the Best Future Self exercise and similar interventions.

## **DISCUSSION**

Despite the substantial improvements in living conditions over the last century, the growing mental health crisis among college students underscores the complexity of well-being, which may be influenced more by subjective factors such as cognitive processes than by objective circumstances. The data suggest a paradox: while physical conditions like poverty, literacy, and life expectancy have improved globally, mental health issues, particularly anxiety and depression, continue to rise among young adults. This discrepancy highlights the importance of psychological resources, such as optimism, in shaping individuals' responses to stressors and enhancing resilience

**Table 1. Summary of Psychological Interventions**

Intervention	Description	Implementation	Outcome	Citation
<b>Cognitive-Behavioral Therapy (CBT)</b>	Teaches students to identify and challenge negative thoughts to foster optimism.	- <b>Cognitive Restructuring:</b> Journaling and analyzing negative thoughts.	Reduced negative thinking, increased optimism.	Beck, 2011; Ellis, 1991
		- <b>ABC Model:</b> Separates events from thoughts and consequences, helping reframe negativity.		
<b>Mindfulness-Based Stress Reduction (MBSR)</b>	Increases awareness and reduces stress, enhancing focus and presence.	- <b>Mindfulness Practices:</b> Guided meditation, deep breathing, and body scans.	Improved focus, reduced anxiety, and increased optimism.	Keng, Smoski, & Robins, 2011
		- <b>Reflection:</b> Journaling mindfulness experiences outside of class.		
<b>Best Future Self Intervention</b>	Encourages visualization of an ideal future to inspire optimism.	- <b>Visualization Exercise:</b> Imagine a successful future.	Enhanced optimism, clear goals, and improved motivation.	Carillo et al., 2019
		- <b>Goal Setting:</b> Identify personal, professional, and relational goals with actionable steps.		

This paper contributes to the literature on stress and coping by integrating research on state-like optimism with the transactional model of stress and coping (Lazarus & Folkman, 1984), a framework that emphasizes the role of cognitive appraisal in determining how individuals respond to potentially threatening situations. It presents evidence that optimism is not merely a personality trait but a malleable psychological resource that can be developed through targeted interventions, such as cognitive restructuring, mindfulness practices, and the "Best Future Self" exercise. By focusing on these strategies, business educators can help students reframe their thoughts, reduce rumination, and view challenges as opportunities for growth rather than as insurmountable obstacles. These are particularly well suited for a discussion on stress management in courses related to organizational behavior.

Moreover, the practical application of optimism-building strategies extends beyond improving mental health. Optimism is linked to various positive academic and professional outcomes, including increased engagement, better problem-solving skills, and greater career satisfaction (Li et al., 2019). Given the challenges of today's dynamic and uncertain job market, teaching optimism in business education can prepare students not just to cope with stress but also to thrive in their future careers. The incorporation of optimism-enhancing techniques into the curriculum could play a critical role in helping students develop resilience, a trait that is crucial for navigating the complexities of the modern workplace.

However, it is also important to recognize the limitations of optimism. While a positive outlook can foster resilience, excessive optimism may result in the neglect of real risks or poor decision-making. Therefore, a balanced approach that cultivates adaptive optimism—characterized by a realistic appraisal of potential risks while maintaining a hopeful perspective—is necessary. Future research should explore the optimal balance between optimism and realism, particularly in educational settings, and assess the long-term impact of optimism-focused interventions on students' mental health and career trajectories.

Moreover, it is important to note that while building optimism is a valuable strategy for managing stress, some students may need additional support beyond what classroom interventions can provide. Business educators should emphasize that seeking help from professional mental health services is a vital resource for students who may be experiencing high levels of anxiety, depression, or other mental health challenges. Referring students to university approved mental health services can ensure they receive the specialized care they need. Encouraging the use of these resources, while normalizing mental health support, reinforces the message that mental well-being is a priority and that seeking professional help is a proactive step towards personal and academic success. Including this information

in syllabi and learning management systems can be a useful, non-invasive, method for providing students with essential mental health tools.

## CONCLUSION

This paper underscores the significance of optimism as a key factor influencing how students perceive stressors and manage their emotional responses. Enhancing state-like optimism in business students can lead to substantial improvements in their mental well-being, academic performance, and long-term career success. By integrating optimism-building strategies into their teaching practices, business educators can help students develop crucial coping skills, fostering a more resilient and adaptable mindset.

Furthermore, the practical applications of optimism extend beyond the classroom. As students transition into the workforce, their ability to maintain a positive outlook while realistically appraising challenges will be critical to their professional development and job satisfaction. The incorporation of optimism-focused interventions, such as cognitive restructuring, mindfulness practices, and goal-setting exercises, can provide students with a robust set of tools to navigate the complexities of their careers.

In conclusion, business educators are uniquely positioned to address the mental health needs of their students by fostering optimism. By promoting a balanced approach that cultivates a realistic yet hopeful perspective, educators can enhance their students' capacity to thrive both personally and professionally. As the global landscape continues to evolve, equipping students with these skills will be essential in developing a future workforce that is not only engaged and productive but also capable of sustaining mental well-being in the face of adversity.

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# Personal Finance for Gen Z: Lessons for Their Financial Future

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## ABSTRACT

Despite pushes for enhanced financial literacy education at the secondary level, most college students in Gen Z still feel underprepared to make crucial, independent financial decisions. Rising consumer debt levels and lack of confidence underscore the urgent need for financial education among young adults. This paper examines the current state of financial literacy for Gen-Zers and discusses the transformation of a personal finance course at a university. This course redesign aims to bridge the gap between the skills learned in basic high school financial education and the higher-level knowledge and decision-making needed for long-term financial success. Key assignments focus on student loans, budgeting, and investing, and incorporate a simulation and real-world scenarios to enhance student learning. The paper provides suggestions as to how to structure higher education personal finance courses to ensure that students are confident in their ability to navigate important financial decisions post-graduation.

**Keywords:** personal finance, financial literacy, consumer debt, student loans

## INTRODUCTION

With both consumer and college loan debt at all-time highs, many college students find themselves ill-equipped to make basic financial decisions. Recent studies indicate that Gen Z (those born between the years of 1997-2012) has the lowest financial literacy, and lowest level of confidence to make financial decisions as compared to other generations (McCann, 2024; Peterson, 2024). For most students, attending college represents their first time away from home, and thus the first time that they are required to make independent financial decisions. Having had limited discussions about and exposure to financial decision-making, many college-aged students find themselves thrust into uneducated decisions around student loans and consumer debt. As such, the role of financial literacy education at the college level is paramount. This paper will review the current state of consumer debt and financial literacy for Gen Z, discuss the recent transformation of a personal finance class including examples of hands-on assignments, and outline short-term results and plans for continuous improvement.

## LITERATURE REVIEW

Consumer debt and the lack of financial literacy remains an undercurrent in our economy. The Greater Phoenix Economic Council states that consumer debt “is calculated by summing up all liability categories, which include mortgage debt, home equity revolving credit, student loans, auto debt, credit card debt and other accounts payable” (Stephenson, 2023, para. 3). This consumer debt can be significant to the economy “because consumer spending accounts for 70% of the U.S. GDP, too much pullback can tip the economy into a recession” (Stephenson, 2023, para. 4). Of particular concern for college graduates is the impact that student loan debt can have for decades. An article on Forbes Advisor reported that current student loan debt is estimated at \$1.77T (federal and private loans), average student load debt per borrower is around \$28,950, and more than half of students leave school with some form of debt (Hahn, 2023).

Coupled with skyrocketing consumer debt is a lack of general financial knowledge and confidence in managing financial decisions. Recent research on confidence in financial knowledge and skills revealed that Gen Z is reported to have the lowest confidence amongst generations, with almost a third of respondents indicating that they do not have confidence in their financial decision-making (McCann, 2024). This lack of financial knowledge has led to difficulties in managing major expenses. Fifty-two percent of Gen-Zers reported that they do not make enough money to afford the life they want to live, and are delaying milestone such as purchasing a home and saving for retirement due to lack of ability to balance their cost of living with longer-term financial goals (Bank of America, 2024). In addition, July 2022 highlights from FINRA Foundation National Financial Capability Study showed 30% of U.S. adults probably or count not come up with \$2,000 if an unexpected need arose, in the last 12 months, 38% of 18–34-year-olds were late with mortgage payments, and 26% took a hardship withdrawal from their defined contribution retirement accounts (FINRA, 2022). FINRA Foundation National Financial Capability Study concluded “Individuals with high financial

literacy are more likely to demonstrate positive financial behaviors such as saving and planning for retirement, and less likely to engage in negative behaviors such as expensive borrowing methods” (p. 16).

The complexities of the consumer debt landscape, coupled with the reality that most of Gen Z is not equipped with adequate knowledge to manage significant financial decisions, underpin the need for financial literacy education amongst young people. There are multiple organizations who assist with financial literacy training and there is a nationwide effort to provide training for high school students. According to Next Gen Personal Finance Advocacy blog, as of March 12, 2024, “25 states and counting will guarantee a standalone personal finance course of at least one semester for all of their high school students by 2030” (para. 13). To meet the “guarantee status”, all students should receive this education, the course must be for an entire semester (not just embedded for a few weeks into another standard), and the personal finance course cannot be substituted for another course.

Negative and risky behavior, such as Buy Now, Play Later (BNPL) services have become prevalent in the past few years with Gen Z showing the highest user rate among other generations. These services allow the borrower to split the purchases into installments. For example, instead of paying \$100 now, it is four installments of \$25. These are marketed as an easier way to make payments than credit cards and with no impact on your credit score. Easy money, right? BNPL borrowers are sounding the alarm and warning others of the advertising practices used by these companies. Table 1 shows the BNPL current and projected users by generation. By 2025, it is estimated that 47.4% of the Gen Z population will be BNPL users (Howarth, 2024).

**Table 1: BNPL Users by Generation**

	2021	2023	2025
Gen Z	36.8%	46.5%	47.4%
Millennial	30.3%	39.5%	40.6%
Gen X	17.2%	26.3%	30.9%
Baby Boomers	6.2%	12%	14.8%

According to CNBC, “the services have drawn the attention of the Consumer Financial Protection Bureau, which found last year that most BNPL users had higher credit card utilization rates and lower credit scores than non-BNPL borrowers. Many appeared to be leaning on the installment loans while shouldering high rates on revolving credit card balances” (McMorvey, 2024, para. 16). These services, however, can be beneficial when used responsibly. In fact, amongst Baby Boomers, the use of BNPL services is expected to more than double between the years 2021 and 2025. According to PYMNTS (2022), “BNPL appeals to older, more affluent demographics on several levels. Forty-three percent of financially ‘worry-free’ individuals say that BNPL programs help them improve their credit scores, and 40% are drawn to BNPL’s lower interest rates compared to traditional credit options” (para. 2). Unfortunately, many college students are unfamiliar with how quickly these purchases can get out of hand and the cumulative impact of each purchase, especially with the potential use of multiple BNPL services.

Under newly-enacted Ohio legislation, students entering the 9<sup>th</sup> grade after July 1, 2022 are required to earn one-half credit of financial literacy for a graduation requirement (Ohio Department of Education & Workforce, 2023). However, despite these legislative changes, EBSCO reports that over 40% of college students are still not equipped with adequate financial knowledge (EBSCO, 2024). Despite the enhanced education taking place at the secondary level, students are still ill-equipped to make important higher-level financial decisions.

Many universities typically offer a Personal Finance course at their institutions. EBSCO research indicated that of the students surveyed, 40% of college students attending 4-year institutions had taken a personal finance course (EBSCO, 2024). Previous research on financial literacy for college students has documented the value and motivation of these courses. Rosacker, Ragothaman, and Gillispie (2009) conducted a pre and post financial literacy test of 101 freshman business school students over the course of two semesters with questions covering a range of financial topics. They concluded “The results of this statistical analysis indicate that the financial literacy training offered significant benefits for freshman business students (para. 16). Xiao, Ahn, Serido, and Shim, S. (2014) conducted a longitudinal study comparing objective and subjective financial knowledge between first year students to fourth year students. A content quiz measured objective knowledge and a self-assessment was used for subjective knowledge. They noted “...objective knowledge may play a stronger role in reducing the more extreme risky borrowing behaviors” (p. 600). These risky behaviors included payday loans and cash advances from a credit card which tie directly back to the BNPL services currently being marketed. They suggested “... financial education programs perhaps should focus on more

than enhancing objective financial knowledge among young adults” (p. 600) and instead use a variety of teaching approaches to enhance both objective and subjective knowledge in order to the student’s confidence in financial literacy and apply the objective knowledge they have learned.

Given the robust body of literature on the value of financial literacy education, it seems that a multi-pronged approach to delivering these types of courses is necessary. While the goal of exposing every high school student to financial education is an important first step, reinforcing and enhancing this knowledge at the college level is critical as many students still appear to be naïve and unprepared to navigate their financial future. This paper will outline one institution’s approach to personal finance education, and provide an outline as to how a similar approach may lead to enhanced financial literacy for young graduates.

## **PERSONAL FINANCE IN THE UNIVERSITY CLASSROOM**

A personal finance course has been part of this institution’s curriculum for many years. This course is currently a general education elective for all university students, so students from across all programs have the opportunity to take this course to count for a general education requirement. Prior to 2023, the course partnered with Ramsey Solutions, utilizing the Foundations in Personal Finance platform as the primary content delivery method. While this platform did provide students with important financial knowledge, the current instructor determined that the content was not as interactive as deemed necessary for students to practice and retain this critical information. Further, there were concerns with both the cost of the platform, given that the course aims at helping students to save and invest money for the future, as well as utilizing the Dave Ramsey platform for the primary source of content. In fact, one student noted, “There wasn’t that much added on to the course would have easily been able to solely take Dave Ramsey course” (Anonymous, Class Climate Survey, 2021). As such, the instructor determined a need for a full course transformation to include integration of instructor-created content, significant interaction with students throughout the course, and a focus on hands-on learning opportunities.

Central to this new course design was the desire to enhance the interactive, practical knowledge transfer. Understanding that most students are coming to this course with at least a basic level of financial knowledge from a high school course, the instructor determined this course would revolve around higher-level financial decision-making and practical application. At the foundation for higher-level knowledge transfer, a new course text was chosen. This advanced course text delves into all the critical personal finance topics students need to master in order to become financially independent. In order to ensure that students understand these elevated concepts, the instructor created weekly videos and accompanying Google Slides to supplement and reinforce each chapter’s content.

At the beginning of the course, students are asked to identify three financial topics they deem are most important to them as they move toward becoming financially independent adults. In this course, students most frequently identify college loans and student debt, budgeting and money management, and investing as their three highest priorities. Below, several of the major assignments in this course are discussed in chronological order, reflecting how the course progresses through the semester. Assignments for student debt, budgeting, and investing are outlined, while the topic of money management is weaved throughout the course.

The course was designed with a scaffolding effect in mind. In the first primary assignment for the course, students are asked to explore two careers of interest. Utilizing O\*Net (<https://www.onetonline.org/>), students do research on starting salaries and the job market for their chosen career. This assignment is critical in that it establishes an estimate of monthly take-home pay, which is utilized for a number of future assignments.

Building off of this, students then complete an assignment estimating their total college debt. To do this, students complete a spreadsheet with sources of funds for their education as compared to total expenses to estimate the total college debt they could accrue. After doing this, students are then asked to use an online debt calculator to determine estimated monthly loan payments. Throughout the course, assignments provide hands-on learning by requiring the students to do research and simulate making important financial decisions, such as apartment rentals, purchasing a used vehicle, investigating car insurance, and estimating retirement savings.

As previously noted, one of the foremost financial topics in students’ minds coming into the course is to better understand investing strategies. In the transformation of this course, one of the primary changes was to significantly increase the focus on understanding the basics of investing. The two primary ways that this was accomplished was to

incorporate an investment simulation that runs the second half of the course, and then through a final project focused on investing.

There are a number of free investment simulation platforms on the market. For this course, the Investopedia Simulation was chosen due to the simplicity of the user interface and student experience. Each semester, the instructor creates a password-protected game for the course. Students are able to sign up for a free account, and use the instructor-provided password to sign up for the class game. Prior to choosing their investments, students are required to complete a risk tolerance assessment. After completing the assessment and determining their level of risk tolerance, students complete a basic asset allocation table, which is directed to be based upon their tolerance to risk.

The following instructions are provided to students in choosing their investments:

- You will start the game with \$100,000 in cash.
- You can buy individual stocks, ETFs, index funds, and bond funds in the simulation. You will be limited to what you can buy in terms of the investments available on this particular simulator.
  - To find index funds, ETFs, and bond funds available within the simulation, please type “ETF” or “index fund” or “bond ” under the Trade tab under the “Symbol” search bar.
- No single investment can exceed 10% of your total assets. Therefore, you must have a minimum of 10 investments in your portfolio at all times.
- Cash must not exceed 20% of your portfolio at any time, which means you should have at least 80% of your assets invested at all times. You should be invested, not sitting on the sidelines.

Students are then provided with resources to conduct research to choose their initial investments in the game. Over the course of the remainder of the term, students are asked to actively monitor their portfolios, but are not required to make changes to their original investments.

Near the end of the course, students are asked to create a zero-based monthly budget. Utilizing their estimated monthly take-home pay from their career assignment, students incorporate previously determined figures for rent, car insurance, student loan payments, and attempt to allocate at least 15% for retirement savings and investments. This is one of the culminating assignments for students, as they must incorporate all the monthly costs that they are likely to face post-graduation and learn to differentiate between wants and needs to ensure they have enough to cover their monthly costs, while still having money to invest for the future. For example, monthly expenditures, like the BNPL or streaming services, may not individually seem significant until they are aggregated into their overall budget. Students are advised to regularly review these costs, determine the value of the services, and make any changes.

The culminating body of work for the term is the Capstone Investment Assignment. This is a multi-faceted project that requires students to reflect upon their Investopedia Simulation experience, and then use this to craft what they believe reflects a long-term diversified portfolio. In this assignment, students again construct a version of an asset allocation table, this time armed with additional knowledge and instructions that it should reflect how they might design a long-term investment portfolio. Following this, students research and choose individual investments to reflect their asset allocation. They then research ten-year trailing returns (capped at 10% for those who choose popular equities such as Tesla, which has performed significantly higher in this timeframe) and, with the aid of an online calculator, estimate what their portfolio could reasonably render at their projected age of retirement. This project requires students to collate everything they have learned about investing over the course of the semester, and apply this to long-term financial planning.

In addition to the practical, application-based assignments throughout the course, students are exposed to experts in various financial topics. Over the course of the semester, students attend guest speakers on the topics of understanding taxes, investing basics, and creating a comprehensive financial plan. Students consistently comment in course evaluations that this is one of their most significant positive experiences from the course. They are able to learn directly from financial experts, as well as have an opportunity to ask questions specific to their experiences.

## **RESULTS AND DISCUSSION**

Since the course redesign, student feedback has been extremely positive. A sampling of student feedback is included below:

“Timely feedback, course was very well organized, always gave insightful comments back to students, this course should be a CORE required course, would prepare students for a productive life and career way more than other CORE classes” (FNCE 200, SP23).

“I greatly enjoyed this course; it offered a vast deal of information about the financial world and provided many different opportunities to learn and explore different aspects of the financial world. I greatly appreciated the amount of instructor interaction with the students, it made the course feel like an actual class as opposed to other online courses” (FNCE 200, FA23).

“I think that this course was incredibly beneficial, very educational, and enjoyable for me personally. I would strongly recommend this course to anyone who would like to expand their knowledge of finances” (FNCE 200, SP24).

Anecdotally, students have shared that the budgeting and investing projects in particular have led to changes in their spending habits and perspective on financial planning. Numerous students have reported starting an IRA before the class has even concluded, and to use the budgeting tool post-graduation. In reading student reflections at the end of the course, a number of students have indicated that this course has been one of the most beneficial during college, and has given them practical life skills that they not only plan to implement, but to share their takeaways with family and friends.

While the course is viewed as successful in meeting the elevated learning objectives, the topic of personal finance is ever-evolving. Given this, continuous improvement and integration of new material is imperative. Currently, there is a two-pronged approach to ongoing course updates. First, student feedback from course evaluations is reflected upon and integrated each semester. For instance, this semester, an attempt will be made at scheduling at least one of the Zoom sessions with a financial expert during the evening. While this is often more difficult to schedule with the financial professionals, it will better allow for dual-enrollment students, as well as working students, to attend these sessions live.

More integral to continuous improvement is the incorporation of new assignments or modification of a current assignment to reflect current trends in personal finance. For example, an assignment related to the ongoing changes to streaming services, especially related to major sports broadcasts, may provide the students with an opportunity to consider the impact of these services to their proposed budget.

## CONCLUSION

The importance of financial literacy is paramount in a society where most Americans are ill-equipped to withstand a financial emergency. However, research indicates that people who understand basic financial concepts are better at managing money, save more for retirement, and make better decisions in managing both investments and debt (Lusardi & Streeter, 2023). The transformation of this course was designed around the premise that active engagement with personal finance content in a higher education setting will positively impact downstream financial management and decision-making.

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# Utilizing Practitioner Instructors in Developing and Delivering Academic Programs

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## ABSTRACT

The Maritime Management Program at Nicholls State University produces workforce-ready graduates equipped to meet specific industry needs. The success of this university-industry collaboration (UIC) is the result of practitioner instructors-- professionals who actively work in industry involved in curriculum design and delivery. The literature hasn't devoted sufficient attention to the utilization of industry professionals in the classroom. This case study seeks to address this shortcoming. Evidence suggests schools of business are recognizing the disconnect between higher education and industry demands. This can be rectified by adopting a more practical orientation towards servicing industry needs. Designing and delivering a curriculum to meet industry needs is achieved in conjunction with industry and the use of practitioner instructors. This article details the development and execution of the maritime program and offers recommendations to schools of business who are seeking to execute on a responsive curriculum via the utilization of industry professionals in the classroom.

Keywords: university-industry collaboration, practitioner instructors, workforce development, program design

## HIGHER EDUCATION AND THE NEED FOR INDUSTRY COLLABORATION

A consistent theme across today's corporate environment is that business schools are having their competitive success eroded by not optimally focusing on providing students with practical skills directly linked to employability (Rosenbaum, Russell-Bennett & Contreras-Ramirez, 2021). This criticism has become more pronounced, and, as a result, it is paramount for academia to equip graduates with the necessary competencies and attributes to directly impact the financial success of the firms hiring them (Lawson, Fallshaw, Papadopoulos, Taylor & Zankom, 2011; Bisoux, 2018). King (2015) reported that 60% of industry leaders surveyed believed the current higher education system fails to meet industry needs. Furthermore, 71% of corporate recruiters struggled to find applicants with significant practical experience when recruiting from higher education institutions. These conclusions align with those in the *2022 Job Outlook Survey* of the National Association of Colleges and Employers, which reported that hiring managers observed a disconnect between what students believe they have to offer and what employers see (National Association of Colleges and Employers, 2022).

Differences between industry and educators have created a significant divergence as academia has moved away from a strong focus on applied content, which may leave faculty ill-prepared to satisfy students' needs for a practical, skill-focused education. As noted by Rosenbaum et al., "To date, many business school administrators and faculty, especially those at AACSB-accredited institutions, have tended to view their competitive advantage in delivering business education as them offering a curriculum that is research-informed, theoretically driven and based on empirical evidence" (2021: 553). These concerns are reinforced by Roos (2004) who noted business faculty are increasingly incentivized to publish in obscure research journals, which are of minimal value to firms. Additional criticism centres on faculty's lack of work experience outside academia, thus translating into educators having difficulty grasping what skills industry require (Wu, Huang, Goh & Hsieh, 2013). The challenge is for business schools to remain relevant in today's competitive business environment without compromising academic rigor.

Evidence suggests business schools are recognizing these disconnects The Association to Advance Collegiate Schools of Business' (AACSB) 2020 standards (and as updated in 2023), while still prioritizing academic rigor, supports a greater movement of business education towards a more practical orientation. Standard 4 mandates accredited business schools to ensure their curricula offer learners "currency, relevancy and competency" (2020: 41), which includes a significant focus on experiential learning and the delivery of high-impact pedagogical practices. As a result, universities are increasingly: adapting to the demand for real-world, industry-based research; incorporating greater

work-integrated learning into education; producing job-ready graduates; and, recognizing the value of relationships between universities and industry (Plewa et al., 2015; Shinn, 2018; Chadwick & Cashen, 2019). These UICs provide multiple benefits including new knowledge and technologies for industry, and greater alignment of programs with the human capital and knowledge needs of the region served. This aligns with AACSB's mandate on *thought leadership, engagement* and *societal impact* as outlined in Standards 8 and 9, which, involves engagement with external stakeholders. Specifically, an UIC may assist a business school to be seen as a thought leader and engaged in areas critical to achieving the school's mission. More than ever, business schools must focus on these issues as they are directly tied to the institution's credibility, legitimacy, and ability to survive (Pettigrew & Starkey, 2016).

The broader literature on UICs has clearly articulated the benefits of partnerships. Despite the documented success of research- and innovation-oriented UICs, less attention is afforded to the development of new undergraduate academic programs designed to address industry needs for a more skilled white-collar workforce (Plewa et al., 2015). Specifically, UICs dedicated to the design and delivery of curriculum address workforce criticisms and deficiencies. An example of utilizing industry practitioners in the design and delivery of curriculum was offered by Wu et al. (2013). The authors detailed how academia worked with industry practitioners to deliver an impactful logistics management program. Their study revealed a significant disconnect in the skills deemed important for educating logistics students when surveying traditional academic faculty versus industry professionals. Academia revealed itself as lacking a responsive curriculum and in need of industry assistance to build impactful and innovative curriculums.

The UIC literature on curriculum design and delivery via the utilization of industry practitioners/professionals is consistent in the desired outcomes, which primarily target the implementation of real-life practices to ensure high levels of graduate employability. Additionally, the business schools that engage in these partnerships simultaneously enhance their credibility and legitimacy (Healy, Perkmann, Goddard & Kempton, 2014). Lawson et al. stated these outcomes are due to the pursuit of *professional learning (PL)*, which references dimensions of educational programs that "highlight contemporary industry issues explicitly linked to industry and professional bodies" (2011: 61). PL encompasses the skills, qualities, competencies, and attributes mandated by industry and the processes through which real-life and enriching skills are acquired by students. Despite consensus that PL is a clear goal of curriculum-oriented UICs relationships, different thoughts exist on the roles industry practitioners play in curriculum design and delivery. For example, lesser involvement by industry may include serving as guest speakers or being surveyed regarding the professional work environment; whereas, greater involvement may include co-creation of curriculum, serving as industry mentors or utilizing industry practitioners as course instructors.

The intention of this article is to offer a descriptive case study supporting the UIC literature regarding effectiveness in the design and delivery of curriculum via the utilization of industry practitioners. A descriptive case study was used as it is often seen as the preferred means of exploring a program in depth and in its real-life context (Priya, 2021). This article extends the UIC conversation regarding the Maritime Management Program (MMP) within the College of Business Administration (CBA) at Nicholls State University as outlined in Chadwick and Cashen (2019). We offer additional insight on how the MMP specifically deploys industry practitioners as undergraduate instructors. The MMP is a highly specialized, which, like other specialized academic programs, necessitates highly specialized faculty *actively* working in industry (Shinn, 2018). The intent of this article is to assist business schools as they seek to maintain relevance and currency in a rapidly shifting world. In subsequent sections, a discussion is offered about specific roles of industry practitioners as instructors and how this program delivers workforce-ready graduates. Attention is paid to how the MMP matches the practitioner with desired competencies and skills demanded by industry. This includes a discussion of how industry practitioners incorporate competencies and PL activities into the curriculum. This article concludes with advice on how to best structure UICs as they pertain to utilizing and managing practitioners as undergraduate teachers.

## **THE MARITIME INDUSTRY IN LOUISIANA**

A 2015 workforce study addressed the need to strengthen ties between higher education and Louisiana's maritime industry with the goal of enhancing and diversifying training options in the state (Louisiana Association of Business & Industry, 2015). Strategies addressing these training options were critical to meeting the future workforce needs of an industry vital to the state.

Maritime employment in Louisiana includes vessel operators, marine terminals, shipyards and cargo workers. A 2020 analysis noted six deep draft ports, nine coastal ports and 13 inland ports in the state. The Lower Mississippi River from Baton Rouge to New Orleans is one of the busiest port complexes in the world, with approximately 6,000 oceangoing ships annually handling 60 percent of the nation's export grain and 20 percent of its energy needs. Louisiana ports have an economic impact of more than \$180 billion annually to the U.S. economy and are responsible for more than 500,000 jobs (Port NOLA, 2021).

According to the Louisiana Association of Business and Industry (LABI), in 2014, one in five jobs and \$3.5 billion in employment income were generated by the maritime industry. During this time, Louisiana was home to the movement of 500 million tons of cargo. The total gross economic impact of \$11 billion, the highest in the country in 2013 (The Maritime Executive, 2014), resulted in nearly \$2 billion in state tax revenue.

Despite its size and scope, a scarcity of qualified personnel was hindering the industry's ability to expand. Advances in technology continued to alter the industry, and thus, the necessary skills of workers. Furthermore, employee turnover further hindered prospects for growth. According to a 2020 study, to provide employers with consistent access to qualified labour, workforce training programs must "reflect the needs of employers" and account for technological advances. Training should also focus on preparing "students to be marketable for any job that is directly connected to the overall health of the maritime industry" (GNO Regional Economic Development, 2020).

## **DEVELOPMENT OF THE MARITIME MANAGEMENT PROGRAM**

While multiple training academies focused on blue-collar workforce needs, there were no programs in the state designed to train entry- to mid-level managers. A 2014 survey conducted by the LABI showed that 91% of maritime companies responding felt more was needed to provide the maritime industry with trained white-collar workers. As noted, "more students must seek to enter this career and move up the career ladder by earning college credit and portable credentials. The colleges should set a goal to expand for-credit maritime training; there should be a credit, non-credit hybrid that benefits both industry and students." (LABI, 2015: 9). In addition, many respondents reported having no relationships with 4-year universities to provide maritime training.

The CBA at Nicholls State University (located in Thibodaux, LA) was uniquely positioned to meet specific workforce needs in maritime-related firms. Located at the epicentre of the maritime industry in Louisiana, the College could position itself to become a valuable and unique source of graduates to one of the most critical industries in the state. Essentially, the desired outcome was a UIC dedicated to meet mutually beneficial objectives: more knowledgeable graduates, higher starting salaries and enhanced economic development. In pursuit of these outcomes, one area of emphasis became the pursuit of PL through extensive industry involvement in not only the co-creation of the curriculum, but also utilizing industry practitioners as course instructors. This, in direct support of the call for workforce training driven by partnerships.

Creating a program to meet professional workforce development needs in maritime-related firms was initiated by industry during a CBA strategic planning retreat. The CBA invited external stakeholders to assist in developing a five-year plan. Included were representatives of maritime firms. One recommendation was the creation of the aforementioned MMP. The CBA thought such an endeavour might be a valuable niche program and that, because of its location, Nicholls State was especially well-positioned to exploit the opportunity.

Investigating the proposal, the dean of the CBA scheduled a meeting with approximately 25 regional business leaders. This task force was presented with two hurdles facing the CBA in executing on an MMP. The first was a lack of funding to develop new academic programs. The second related to the design and delivery of an effective MMP. The CBA did not possess the necessary skills, capabilities and industry insights to design and teach the curriculum. The CBA proposed a partnership where industry would lead fundraising for developing and implementing the program. Within a few months the business leaders raised approximately \$300,000. Members of the task force were also assigned to a curriculum development and delivery sub-committee to work directly with the CBA to develop courses, content and what would ultimately become the Maritime Management Concentration. This concentration consists of existing business courses taught by current academic faculty members, as well as nuanced maritime management courses taught by experts actively working in industry. Through a series of meetings with business leaders, the CBA

was able to create courses and a curriculum within the existing four-year management degree. The program was truly designed by industry, for industry. The utilization of industry practitioners as teachers was recognized as a critical component in achieving workforce-ready graduates. This would ensure a significant focus on PL activities, thus delivering on competencies directly linked to value creation and long-term career success. These practitioners, and their wealth of knowledge and expertise, continue to play a critical role in enhancing the student learning experience through active and diverse experiential learning activities.

A decision was made to develop the MMP and to structure it as a *concentration* under the existing management degree/major. A concentration provides graduates with specialized industry knowledge within the major. As such, it does not deprive the student of broader exposure to other areas of management critical to a 4-year AACSB accredited business degree. Additionally, housing this program under the management degree does not limit the career flexibility of graduates since their major is still management, which trains students in other areas of the discipline, such as production and operations, human capital and organizational behaviour. These more general areas of study are valuable to all companies irrespective of their participation in the maritime industry.

As of the fall 2024 semester, there are 52 students in the MMP. Since its inception, nearly 190 students have enrolled in the program and approximately 140 have graduated. The College continually recruits prospective students to meet industry's demand for graduates, which often outpaces the supply. Given the existing faculty resources, the program is positioned to accommodate up to 90 or so students at any given time.

The following section introduces maritime-specific courses developed in collaboration with industry. By utilizing industry's input, and practitioners as teachers, the MMP can directly address the evolving dynamics of the maritime industry's workforce needs. According to Lawson et al, these PL activities encourage "deep learning in relation to the student's future profession" through "industry engagement, work-integrated learning and authentic learning environments" (2011: 62-63).

## THE CURRICULUM

The MMP contains four maritime-related courses that offer the students focused insights into the industry. These include *Introduction to Maritime Management*, *Admiralty Law*, *Economics of Shipping* and the *Maritime Management Internship*, which is to be completed in a maritime-related firm. These courses are reviewed below with discussions of course content and specifics related to the industry practitioners serving as instructors. Additionally, examples of instructors deploying a variety of PL activities (see Lawson et al., 2011 for a list of PL activities) and a competency-based curriculum (see Chyung, Stepich & Cox, 2006 and Wu et al., 2013) are also discussed.

### Introduction to Maritime Management

This course provides an overview of maritime history, ship designs, vessel management, emerging markets, and safety and regulatory requirements. Students are better prepared for entry into the industry due to their enhanced understanding of industry-specific terminology, vessel types, and various aspects of internal and external vessel management. During the curriculum design process, industry experts noted significant deficiencies of new hires in base areas of the industry, such as the language, terminologies, work flows and regulations.

The CBA identified and recruited three industry practitioners to help design and teach this course. The experts felt a team-based approach was the most appropriate due to the breadth of topics covered. Each instructor focuses on their area of expertise and brings real-world application into the classroom. The combined industry experience of the instructors is over 90 years. This facilitates the effective use of PL activities and the building of competencies for graduates to be competitively successful in the job market (Chyung et al, 2006). Exposing students to industry-specific competencies is often done in real-time parallel to the challenges facing the instructors at their job. Two examples are as follows:

- One fall semester, the Louisiana coast was threatened by a hurricane in the Gulf of Mexico. During class, the instructor's firm began implementing their emergency preparedness plan. The instructor took the opportunity to execute on this emergency protocol in coordination with the students. As a result, they were able to actively engage in the real-time implementation of the emergency plan. This included ensuring vessels, equipment and personnel were secured and a plan to ensure business continuity following the

storm.

- Another of the course instructors was one of only a few civilians appointed to the U.S. Coast Guard Board of Marine Investigation (part of the Department of Homeland Security). This Board worked with the National Transportation Safety Board (NTSB) to investigate the April 13, 2021 sinking of the *SEACOR Power* in the Gulf of Mexico and the death of 13 crew members. This lift boat capsized in turbulent seas about seven miles south of Port Fourchon, LA. During the two-week hearing, the Board reviewed evidence related to the loss of the vessel and its crew members. Due to his industry expertise, and the public nature of the investigation, the instructor was able to intimately expose students to this tragedy and the nuances of the decisions made. These types of hands-on training and industry insights are only available with faculty possessing current and significant industry knowledge and experiences.

### **Admiralty Law**

This course provides a historical and jurisdictional perspective of maritime law. Specific content includes, but is not limited to: law jurisdiction; personal injury and death claims; maritime worker's compensation; maritime torts and salvage; and cargo law. In developing the program, sponsoring firms stressed that graduates have a basic understanding of maritime law. This, due, in part, to the industry being one of the more highly regulated and litigious in the world. It is worth noting that Nicholls State University's service region is geographically centred at the confluence of the busy waterways and ports of the Lower Mississippi River, the U.S. Intracoastal Waterway, the Gulf of Mexico, and the epicentre of the U.S. offshore oil industry. Maritime law issues are regularly encountered by marine entities and their attorneys. Additionally, the state and federal courts of the area routinely handle a robust docket of maritime cases.

Since its inception, this course has been taught by a legal expert, who is an alumnus of the CBA. He also graduated in the top 10% of his class from the Georgetown University Law Centre and has practiced admiralty-related law for over 30 years. Drawing on his vast experience in the field, he incorporates into class sessions real world scenarios experienced by marine operators.

As an example of such a scenario, the instructor represented three organizations which responded, either voluntarily or under contract, to the explosion of the semi-submersible drilling rig, *Deepwater Horizon*, which ignited on April 20, 2010 off the coast of Louisiana. This catastrophic event caused what is widely regarded as the worst marine pollution event in U.S. history. Despite their valiant efforts to assist, these three firms were sued and became entangled in the resulting class action litigation initiated by various injury and damage claimants. The instructor used the example of the *Deepwater Horizon* casualty, litigation, and vessel limitation filings to explain the nature and historical origin of the limitation of liability statute. This and other examples are actual cases handled by the course instructor in his law practice.

### **Economics of Shipping**

This course investigates factors influencing supply and demand in the energy, commodities, and maritime services markets. This includes discussions of: taxation, subsidies and various governmental actions; the domestic and international economic challenges for maritime services firms; costs for a firm in the industry, and the risks associated with large capital investments; and the nuances of the financial statements of a maritime-services firm. These topics are addressed by an industry practitioner instructor who graduated from the U.S. Merchant Marine Academy in Kings Point, NY and earned his MBA at Nicholls State University via the Executive MBA Program. His 30 years of experience in the industry enhances students' direct exposure to competencies currently mandated by maritime firms, thus enhancing employability.

An example of developing the work-ready competencies, the instructor exposes students to various modes of shipping transportation, and their advantages and disadvantages as they relate to the economic and financial impact on the firm. Students directly interact with actual shipping firms to assess the optimal means of transporting a specific product to a specific destination. Receiving actual bids for moving freight under different terms exposes the students to the value in securing multiple quotes, the extra cost for expedited shipping, and the advantage of less than truckload shipping versus truck load shipping for smaller parcels. The practitioner instructor's access to shipping firms, intimate

knowledge of the problems presented, and ability to incorporate his experience helps enhance the credibility of the MMP and its graduates.

### **Maritime Management Internship**

This course provides students with supervised practical experience performing managerial tasks in approved maritime-related firms. This internship requirement was demanded by regional business leaders so as to enhance industry-relevant competencies. Specific reasoning was attributed to the unique nature of the industry that necessitates a first-hand and intimate perspective of the operations of maritime-related firms. In other words, the curriculum development and execution team saw experiential learning as a critical educational experience. The feedback from students and firms has been extremely positive as both groups recognize the vital role internships play in developing workforce ready graduates.

According to Gibson, Brodie, Sharpe, Wong, Deane, and Fraser (2002) real-life experiences provide students with benefits often unavailable in the traditional learning environment. These include establishing a work history and professional network, as well as first hand exploration of their chosen field. PL though internships also provide an opportunity for students to develop confidence and motivation (Moreland, 2005). The importance of applied professional learning is echoed by the *College Learning and Career Success* study of the Association of American Colleges & Universities (AACU), which believe that requiring students to apply knowledge in real-world settings is critical to career readiness (AACU, 2015). In addition, research suggests that graduates with relevant experience are generally preferred by employers (Milenkovic, 2022). The benefits of the internship for employers are notable since firms may assess a student's suitability for employment, as well as potentially access university resources that might encourage further cooperation in pursuit of mutually beneficial opportunities. (Gibson et al, 2002).

In addition to these maritime courses, industry also mandated that MMP graduates demonstrate proficiency in human resources, multinational management topics and a range of more mainstream legal issues. As a result, MMP students complete multiple human resource management courses, a multinational management course and two additional law classes – business law and commercial law. These courses are part of the current business curriculums in the CBA. Lastly, firms assisting with the curriculum design wanted students exposed to a marine accident prevention course, which is an existing course at the University. The exposure to federal rules and regulations better prepares students to recognize and reduce/prevent accidents in the workplace. The faculty member is a board-certified safety professional with almost 30 years of experience in risk management and occupational safety and health.

### **MEASURING SUCCESS OF THE MMP**

The success of the MMP is measured by assessing the employment opportunities delivered for the students. Since its inception about 10 years ago, the MMP has placed students in over 130 internships with approximately 80 regional maritime-related firms. Many students are offered full-time positions upon completion of the internship.

The industry practitioners used in curriculum/course design and delivery are consistently focused on the career opportunities of students and the needs of employers. As noted in the following section, oversight of industry-focused programs must continually evolve. Although initially designed to service the oil and gas industry in the Gulf of Mexico, the MMP is becoming more attractive to maritime organizations operating along the Mississippi River and inland waterways. These firms have become increasingly involved in the internship program, as well as a source of employment for graduates. More recently, career opportunities for MMP students are also focused on oil and gas energy alternatives, such as wind energy. One of the MMP's instructors has, for years, been actively engaged in examining wind energy opportunities in the Gulf of Mexico. That experience, combined with his relationships, has resulted in internship and employment opportunities with firms actively engaged in developing offshore wind farms not only in the Gulf of Mexico, but also along the east and west coasts.

The MMP's focus on the employability of its graduates has translated into more than 90% of them being employed at maritime-related organizations. Additionally, multiple firms have hired several MMP graduates because of their satisfaction with the program. These employment outcomes speak to the increasing mandate for business schools to address employability of graduates. The design and delivery of the MMP curriculum is grounded in active learning/experiential techniques and professional development opportunities as advocated in the literature (Kuh, 2008;

Lawson et al., 2011; Gasper & Lapinski, 2016). Each suggests that experiential learning is appropriate for conveying knowledge and helping students establish mastery. Optimizing learning through experiential exercises necessitates faculty having knowledge of the latest trends, relationships within the industry and an understanding of expected competencies (Chyung et al., 2006). Hora and Lee argued that intimate industry experiences by faculty successfully inform the design of learning activities that effectively “simulated authentic problems as much as possible” (2020:22). In addition to these PL practices, the MMP’s curriculum incorporates a number of industry guest speakers and judges/panellists for case and project presentations.

## **ADVICE FOR SUCCESSFULLY MANAGING THE PRACTITIONER INSTRUCTOR RELATIONSHIP**

As evidenced in the creation and execution of the MMP, substantial time and resources are required. Specifically, the utilization of practitioners as instructors is not an area with a great amount of insight or guidance. The majority of the research surrounds the degree to which traditional faculty possessing varying degrees of industry and practical experience can produce work-ready graduates (Plewa, et al., 2015; Gasper & Lipinski, 2016; Hora & Lee, 2020). Based on the experiences of the CBA successfully designing and delivering the MMP, we would like to offer the following points to those business schools contemplating UICs that directly incorporate *industry practitioners as undergraduate teachers*.

### **The Execution of the Program is Only as Good as its Formulation**

For the industry practitioners to deliver work-ready graduates, the program must be well-designed. It is not uncommon for there to be disconnects between what traditional educators (e.g., *Scholarly Academic* faculty as labelled according to AACSB) view as necessary competencies versus those deemed critical by industry practitioners. This disconnect was documented by Wu et al. (2013) when discussing the design of a global logistics management program. There were significant differences noted when the two groups ranked 50 logistics-related skills by importance to employers and career success. Approximately, 50% of the skills were weighted quite differently by the two groups. The findings suggest the logistics program was not well aligned with industry and did not provide sufficient coverage in key areas. The main conclusion was that academia was a clear laggard in regards to a responsive curriculum.

The process outlined by Wu et al. (2013) serves as a road map for educators and practitioners to work together to co-design a curriculum for a rapidly changing business environment. The takeaway is that an effectively delivered collection of courses and lessons is built on the foundation of a properly formulated curriculum. This has never been more salient than today, as education is facing profound disruption and uncertainty (Rosenbaum et al. 2021). Such uncertainty results from, in part, a combination of: increasing competition for education dollars; fewer incoming full-time freshmen starting in 2025 (Adams, 2020); the rise of online “powerhouse” universities (e.g., Southern New Hampshire University and Western Governors University) with massive enrolments and advertising expenditures (Lederman, 2020); and, readily available open online courses (MOOCs) and certifications. Rosenbaum et al. (2021) suggest that such events create potential conflicts in managing institutions of higher education to accommodate both research and employment demands. In response, we advocate a collaborative model where the curriculum is industry-driven. Finally, we strongly encourage curriculum design and delivery to not be viewed from a ‘one and done’ mindset. It is critical for the program coordinator to foster an environment and culture of constant modifications.

### **Focus on a Competency-Based Curriculum That Drives PL Activities**

The prior discussion focuses on delivering graduates with attributes aligned with industry. We recommend doing this by focusing on a competency-based curriculum. A *competency* is a combination of knowledge, skills and abilities to effectively perform the activities of a given occupation or function to the standards expected in employment (Chyung et al., 2006; Wu et al., 2013). We strongly advocate a competency-based curriculum as it feeds the intent of programs like the MMP, which is to convert learning experiences into performance-based organizational outcomes. This is optimally achieved by: (a) taking the main objectives of every course and translating them into applicable competencies and skills, and (b) for each course, developing PL activities/assignments that will assist students in obtaining those competencies. We advocate that the PL activities are purposeful and driven by requisite competencies (e.g., communication, leadership, and interpersonal), functional skills (e.g., constructing a marketing plan, foreign language, and understanding financial ratio analysis), and personal abilities (e.g., honesty, integrity, and an attention to detail).



The main risk to avoid is industry practitioners creating a disconnect between their teaching and assessment methods and the competencies demanded by industry. For example, industry practitioners may inadvertently allow personal and/or firm-specific experiences to drive course content, competency development, delivery, and PL activities. This, as opposed to those competencies demanded by industry (Chyung et al. 2006; Hora & Lee, 2020). Connected PL activities can transform students by: offering realistic insights into the profession; establishing a professional network; applying theory in a work context; and, increasing personal development in the areas of confidence, maturity, and personal growth (Lawson et al., 2011). As such, the challenge is for program coordinators, practitioner teachers, and industry experts to jointly identify the types of PL activities available for the classroom and to develop a strategy for how to best embed these into the curriculum.

### **Managing the Half-Life Effect of Knowledge**

To extract maximum value from industry practitioners they must remain intimately connected to the industries served by the UIC. Exposing students to relevant experiential-learning projects requires faculty to have knowledge of the latest industry trends and expectations. One of the main value propositions of industry practitioners as teachers is that they are constantly exposed to the latest industry knowledge. This lessens the likelihood of their experiences becoming irrelevant. Adapted from the phenomenon in nuclear physics, the half-life effect of specific skills equates to the time it takes for half of everything a professional knows about his/her field to become obsolete. According to Schuller & Saint (2020) this equates to roughly 8-10 years for economics and 5-6 years for finance.

As mentioned, utilizing industry practitioners with ongoing experience minimizes the chances of an instructor being unable to engage students in PL opportunities. Additionally, this allows for greater ease in updating the curriculum to ensure a relevant, innovative and responsive program (Lawson et al., 2011; Wu et al., 2013). We feel the more nuanced the academic program, the greater the call for industry practitioners for the nuanced courses in the program.

### **Hiring Industry Professionals with Professional Experience Does Not Guarantee Success**

It is not sufficient to merely place practitioners in the classroom without adequate training in educational theory and practice (Hora & Lee, 2020). Clinebell and Clinebell suggest, “one concern with the use of practitioners, especially lower-level executives, is that they may teach how their specific organization operates rather than concepts and theories that apply to a variety of organizations” (2008: 101). Additionally, Oleson and Hora (2014) suggest that practitioner faculty with non-academic experience may have their teaching and course management influenced by their role in industry and/or other non-academic settings. As a result, the challenge is to ensure the delivery of courses by industry practitioners is done in a way where course and program learning outcomes are achieved.

Industry practitioners are typically unfamiliar with best practices of designing and delivering a course. Issues commonplace to academicians, such as creating a syllabus, determining appropriate class assignments, and utilizing learning management systems (e.g., Canvas), are areas where practitioners may be lost. Providing an orientation that covers many of such critical areas is a key towards successfully utilizing industry practitioners. Additionally, assigning a traditional faculty member who serves as a mentor to a practitioner is not uncommon (Shinn, 2018). This allows scholarly academic faculty to assist with, among other things, the delivery of the course, documenting assurance of learning and properly delivering feedback to students. Department heads must also be actively involved by reviewing student evaluations/feedback with the practitioner faculty to develop strategies for improvement. Furthermore, department heads may engage with students during the semester for feedback on the practitioner faculty member. Lastly, department heads must ensure that opportunities for development and improvement (such as attending teaching conferences and workshops) typically offered to academic-qualified faculty, are also available to industry practitioner faculty.

### **Develop Bench Strength in Your Industry Practitioner Talent**

Although traditional Ph.D. faculty are less equipped than industry practitioners in addressing curriculum needs in niche programs, one of the risks of relegating these duties to industry practitioners is that due to their nuanced and in-depth skill sets, they may be more difficult to replace. One upside to this discussion is that many executives, seeking an intellectual challenge and looking to give back, are intrigued and drawn to the idea of teaching (Clark, 2018). As such, it is critical to constantly think about succession planning to ensure program continuity. An avenue for doing

this is to rely on the professional network of the current industry practitioners. By doing so, a program coordinator can build a pool of professionals interested in teaching at the collegiate ranks.

## LIMITATIONS

This single descriptive case study has documented the continued success of the MMP since its inception. As mentioned, UICs have been ubiquitous in fostering collaborations in research and innovation, but are not well-documented in the development and delivery of curriculum in the classroom. The authors note three limitations of this manuscript. First, we are unable to empirically assess and verify if there are any confounding variables or other factors contributing to the success of the MMP. The largest contributing reason is that there is not a foundation of documented research to draw upon where UICs have been used in curriculum development and the use of industry practitioners as instructors. The authors concede that this case study draws on a single educational program, in a single area of study, and at a single university. Second, the authors are uncertain of the generalizability of the MMP design and implementation model to all higher education institutions and programs. As mentioned, an institution whose administration prefers a more research-informed and theoretically-driven curriculum may struggle with legitimating and implementing the model in this case study. Third, the premise of the practitioner-led curriculum is the identification and utilization of industry practitioners and workforce needs. Calls for greater UICs tend to be driven more by groups where the links between academia and industry are more evident. For example, multinational entities like AACSB-International and the Accreditation Board for Engineering and Technology (ABET) consistently advocate for the co-creation of knowledge and co-education and/or development of workforce talent. These connections are less evident across some curricula where the link between educational programs and specific workforce needs are not easily matched, such as degrees in philosophy or political science.

## CONCLUSION

UICs are increasingly valuable in today's rapidly evolving landscape. The call for graduates with competencies required by industry are well-documented. The literature suggests the majority of faculty with industry experience are business professionals transitioning to academic roles *or* academicians obtaining part-time industry experience. However, the concern with these scenarios is that they are not optimally-impactful and potentially dated, thus, not delivering on the mandate to produce graduates with critical workforce competencies.

This article attempts to extend the UIC research by specifically focusing on a case study where a school of business successfully designed a program that continues to deliver workforce-ready graduates with skills desired by industry. This is accomplished, in big part, by employing practitioners currently in the industry, as teachers. Offered through the CBA at Nicholls State University, the MMP continues to develop graduates demanded by maritime-related organizations in its service region.

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# Co-Curricular Experiences to Enhance Business Education

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## ABSTRACT

This paper describes the integration of co-curricular experiences to enhance business education at a large regional public university. Grounded in experiential learning approaches and aligned with the institution's PolyX (Signature Polytechnic Experience) framework, these provide a comprehensive approach to student engagement and development. The initiatives presented as a case study range from the First-Year Experience (FYE) program to departmental-level activities and a center of excellence, offering students opportunities for hands-on learning, interdisciplinary projects, and community engagement. These initiatives are designed to foster critical competencies such as analytical thinking, teamwork, leadership, and ethical decision-making, while enhancing student engagement, career readiness, and a sense of belonging.

The insights from the design and implementation of these initiatives contribute to the growing body of literature on experiential learning in higher education. This paper explores how integrating co-curricular experiences can complement curricular learning, prepare graduates for the evolving demands of the workforce, and inform future innovative practices in business education.

**Keywords:** Business Education, Co-Curricular Experiences, Experiential Learning, PolyX Framework, First-Year Experience, Student Engagement, Career Readiness, AACSB

## INTRODUCTION

Co-curricular experiences, such as experiential learning projects, digital badges/micro-credentials, and academic student clubs are increasingly used to enhance the higher education experience for students. Benefits of engaging in co-curricular activities range from acquiring life and career skills and hands-on experience to creating community and fostering a sense of belonging. These opportunities can provide a competitive advantage to universities as they navigate an increasingly complex and ever-changing higher education landscape.

This paper provides the context for co-curricular activities in higher education with a focus on higher education in business, highlights the literature on co-curricular experiences, and presents a case study of co-curricular opportunities in a college of business at a large public university. These opportunities span the range of a students' time at the university, from First Year Experience to experiential learning via a Center for Innovative Analytics.

## BACKGROUND LITERATURE

The Council for the Advancement Of Standards in Higher Education, in its glossary of terms (CAS, 2024) defines co-curricular activities as ones that “reinforce or complement classroom curriculum.....they serve to support student learning, development, and success”. There is an increasing body of literature highlighting the role of co-curricular experiences in higher education. In a report referenced in Inside Higher Ed (Mowder, 2023), researchers found that students who have active learning opportunities are more likely to feel that they belong at their college or university, increasing persistence and retention, and contributing to overall student success.

Abras et al (2022) identify co-curricular learning as part of the student's authentic and real-life engagement and highlight the importance of co-curricular learning as part of the student learning portfolio. They cite prior research on high impact practices which highlights the interdependence of curricular and co-curricular experiences as part of a learning process where additional experiences could be transformative.

Researchers have studied the relationship between college student satisfaction and engagement. Using a sample of the National Survey of Student Engagement (NSSE) data, Korobova and Starobin (2015) found that student satisfaction with their entire experience is related to their level of engagement, including student-faculty interactions. In a more recent study using both home-grown Student Satisfaction Survey data and NSSE data at a large university (Hwang

and Wao, 2021), the authors studied the relationship between student satisfaction and engagement. They found that highly satisfied students tend to be more engaged in educational activities. Although they do not specifically use the term 'co-curricular', the engagement indicators include higher-order learning, collaborative learning (learning with peers), and student-faculty interactions. In our case study, examples of co-curricular experiences include opportunities for these engagement indicators.

Co-curricular experiences can start in a student's first year in college and span their entire time at the institution. In a study of co-curricular experiences as part of the first-year experience (Tabvuma et al, 2023), the authors found that students with co-curricular first year experiences feel they are more successful in understanding course material, academic performance, managing time, working in groups, and relating to their professors. The authors argue that co-curricular experiences equip students with the skills and competencies needed to succeed. In our case study, we highlight our experience with integrating a co-curricular experience as part of the first-year experience.

Co-curricular experiences can provide students with opportunities to develop their leadership skills. In interviews about the leadership experiences of recent alumni who had co-curricular involvement (Rosch et al, 2023), the authors found that students valued teamwork skills gained from their experiences, and recognized group needs over individual desires in decision making. According to the authors, these findings suggest that co-curricular leadership experiences as undergraduates led students to learn that leadership is an interdependent process, not undertaken by a single individual, and that the needs of the group are greater than the needs of any one individual when it comes to organizational effectiveness, with group success being the primary goal. In our case study, experiential learning via interdisciplinary teams that work on industry and community partnership projects is a key co-curricular experience for students that helps develop their teamwork and leadership skills.

Jackson and Dean (2023) studied the role of work-integrated learning (including workplace based as well as non-workplace based) in students' perceptions of employability. Based on self-reported survey data in the Australian context, they found that work-integrated learning that was not based in the workplace was particularly effective for developing collaborative skills while workplace-based learning was more effective for preparedness for employment. They conclude that different forms of work-integrated learning can be used to enhance the students' experience. In a related paper (Jackson and Rowe, 2023), the authors reported positive results for industry mentoring (as part of co-curricular experiences) increasing the chances of securing full-time work. Our case study includes students working with industry and community partners in teams (with mentoring from the partners), providing experiential learning as a key component of the overall educational experience.

Involving students in co-creating curriculum has been shown to have positive outcomes (Lubicz-Nawrocka and Bovill, 2023). They report that the experience of co-creating curriculum, and the resulting shared ownership has transformational potential for students, including developing positive relationships and community; increased engagement, motivation and enjoyment; taking risks and overcoming challenges; and better academic achievement and retention. While it may not be practical to involve students in co-creating curriculum on an extensive basis within the traditional curriculum structure, co-curricular opportunities, such as the ones described in our case study, provide students with a platform to shape their experiences through being empowered to partner and co-create the 'curriculum' that will guide their transformation.

Experiential learning via hands-on workshops can be an important aspect of co-curricular engagement. Saxena et al (2023) describe their experience with offering workshops on financial literacy, specifically the topic of investing in financial options. They list literature showing a lack of financial literacy among college students, and that financial literacy can lead to greater financial stability. The authors offered the workshops at no cost to participants. They found a significant increase in interest and knowledge among workshop participants. Our case study includes our experience offering workshops on analytics tools to increase the career-readiness of students.

Co-curricular experiences extend to digital badging/micro-credentialing. These have gained momentum in higher education as colleges and universities adopt innovative practices to augment the traditional transcripts to certify and communicate student competencies and achievements to prospective employers. In a literature review of micro-credentials (Tamoliune et al, 2023), the authors studied 32 articles and found that 18 of the articles discuss the integration of micro-credentials for re-skilling and up-skilling and for increasing employability. Micro-credentials can also be a tool for advocating life-long learning and enable higher education institutions to respond to industry needs.

In another literature review of micro-credentials and digital badges in higher education (Ahsan et al, 2023), the authors note the growing trend in micro-credentials as a shift towards competency-based education. They categorized the articles into four clusters considering: micro-credentials as an innovative learning model to fulfill the demands of twenty-first century skills; micro-credentials as an incentive for achieving goals; design and implementation including the role of industry partners; and curriculum design and assessment. In this paper, in addition to describing the variety of co-curricular experiences in our case study, we outline a proposed structure of a digital badge to add to the portfolio of co-curricular offerings.

## **CO-CURRICULAR EXPERIENCES IN THE AACSB CONTEXT**

The AACSB Standards (AACSB, 2024) make several references to co-curricular experiences. The standards highlight the importance of experiential learning opportunities that promote engagement and interaction between faculty, students, and business practitioners, and encourage both curricular and co-curricular activities through which business schools can have positive societal impact. The standards also mention the United Nations Sustainable Development Goals (UNSDGs) in the context of societal impact.

Two examples of experiential learning are highlighted in an AACSB insights article (Keller and Jain, 2023). Northern Kentucky University launched a Center for Student Excellence focusing on experiential learning to simulate conditions that students will face in the corporate world, including ambiguity and uncertainty. Opportunities offered included projects and internships. At Montclair State University, experiential learning is embedded in co-ops, internships, and projects, and in particular, the article describes opportunities via a business analytics capstone course to analyze real-world problems.

Lapidus et al describe a required co-curricular program in a College of Business at Northern Illinois University (Lapidus et al, 2015), called the Passport Program. The primary goal of the program is to positively impact the career success of students as they graduate and enter the workforce, with secondary goals including increasing student involvement and providing students with business related experiences. The program has seven areas of focus, for example, leadership, business communications, experiential learning, and career development, and a student must attend one event in each category to complete their passport. They found via a self-reported survey that students (regardless of whether they completed the program or not) believe that out of classroom activities enhance their marketability and help them achieve their goals. While this article is from 2015, a current search of the website of Northern Illinois University's College of Business (2024) shows that the program is still in use, with opportunities for students to earn digital badges.

The remainder of the paper presents our case study of the range of co-curricular experiences available to students in the college of business at a large regional public university. We start with the institutional context, followed by co-curricular experiences in the college-level first year experience program. The paper continues with experiences at the academic department level and culminates with experiences offered via one of the college's centers of excellence, a center for innovative analytics.

## **INSTITUTIONAL CONTEXT FOR CO-CURRICULAR ENGAGEMENT**

At a large regional public university, co-curricular experiences are integral to the institution's mission of promoting student success and preparing graduates for both the future of work and civic engagement. The university's polytechnic identity focuses on integrating theory with practice, and co-curricular activities provide hands-on experiences that complement classroom learning. These initiatives build essential skills such as creativity, problem-solving, and teamwork, all aligned with the university's Strategic Plan and Academic Master Plan, which emphasize experiential learning, innovation, and community involvement.

### **The PolyX Framework: A Signature Polytechnic Experience**

A key component of the university's co-curricular strategy is the PolyX (Signature Polytechnic Experience). The PolyX framework enhances student learning through interdisciplinary, experiential opportunities. Students collaborate on multidisciplinary teams to address real-world challenges through community-based projects. These projects foster critical competencies in students and reflect the university's commitment to developing graduates well-prepared to navigate an evolving global economy.

### **Fostering Student Success and a Sense of Belonging**

Co-curricular experiences through PolyX are intentionally designed to cultivate a strong sense of belonging which is a critical factor in student retention and graduation. One of the key objectives, as outlined in the university's Strategic Plan, is to enhance student engagement by fostering mutually beneficial connections within and outside of the campus community. PolyX achieves this by promoting collaborative projects that bring together students, faculty, and community partners, and creating opportunities for meaningful interactions and shared learning experiences. These collaborations help strengthen the bonds between members of the campus and broader community, encouraging a deeper sense of learning, involvement, and support.

University's commitment to co-curricular engagement begins early with the First-Year Experience (FYE) program. FYE integrates new students into the campus-wide academic and social environments right from the start of their academic journey, focusing on team-based projects that introduce essential skills like problem-solving, collaborative learning and leadership. This integration of curricular and co-curricular learning ensures that students take part in applied learning, setting the foundation for their continued development throughout their educational pathway.

### **Promoting Career Readiness Through Digital Badging**

The university's co-curricular programs are essential in enhancing career readiness. The digital badging initiative enables students to earn micro-credentials that recognize skills and competencies cultivated through co-curricular activities – from leadership development to teamwork and industry-specific badges. This initiative directly supports Strategic Plan's goal of preparing students for the future of work and civic engagement by providing tangible evidence of their abilities to potential employers. By converting co-curricular experiences into recognizable qualifications, digital badges provide students with a distinct advantage in the job market. This initiative strengthens university's commitment to lifelong learning and continuous professional development, both key elements of its polytechnic identity.

### **PolyX's Multifaceted Impact on Learning and Development**

PolyX strongly influences both student learning and faculty engagement. Through initiatives like the Learn Through Discovery Institute, faculty can design unique PolyX experiences, fostering innovation in teaching and mentorship. This faculty-driven approach ensures that educational experiences are closely aligned with industry demands and societal challenges, strengthening the connection between the university and the broader community.

Emphasizing community engagement, PolyX aligns with the Strategic Plan's goal of being a national leader in inclusive polytechnic education. It empowers students to address pressing issues in the community - sustainability, social justice, and technological innovation—reflecting the university's dedication to social responsibility and ethical leadership. By focusing on high-impact practices like mentorship, interdisciplinary collaboration, and community-based learning, PolyX is instrumental in promoting student success, particularly among historically underrepresented groups.

### **Transformative Outcomes and Broader Implications**

Co-curricular activities within the PolyX framework foster innovation, teamwork, and cross-disciplinary problem-solving, effectively bridging the gap between theory and practice. These experiences not only prepare students for the workforce but also develop critical skills in civic engagement and ethical leadership, aligning with the university's mission to promote social responsibility and active citizenship.

For faculty, PolyX enhances teaching by integrating applied learning and interdisciplinary projects that address societal challenges, thereby enriching the co-curricular experience across diverse disciplines and strengthening community partnerships.

Strategically, PolyX is instrumental in advancing student success, career readiness, and civic engagement. Through experiential learning, digital badging, and community involvement, graduates develop the practical skills and confidence needed to thrive in an evolving professional landscape while contributing meaningfully to society.

### **The First-Year Experience: Building the Foundation**

For first-year students, the benefits of campus-wide co-curricular programs are most evident in the First-Year Experience (FYE) program. Integrating PolyX into FYE helps ease the transition from high school to college, providing first-year students with hands-on experiences and early exposure to their chosen major. Grounded in high-impact practices, these experiences foster students' academic engagement and develop foundational skills essential

for success throughout their academic experience. The next section further examines the FYE program, highlighting its role in cultivating critical skills, fostering community engagement, and promoting ethical leadership among our students.

## CO-CURRICULAR EXPERIENCES IN THE COLLEGE-LEVEL FIRST YEAR EXPERIENCE PROGRAM

The First Year Experience (FYE) program at the College of Business Administration (CBA) was developed to address gaps in student retention, academic success, and engagement. By providing an early introduction to the disciplinary studies, the FYE course helps students navigate the challenges of their transition from high school to university. It focuses on developing the skills and perspectives first-year students need to succeed in the academic coursework.

### Program Development and Rationale

The need for a dedicated FYE course in CBA arose from several factors. Data collected through academic assessments revealed that business students were less likely to persist through their first year and graduate on time compared to their peers in other colleges at the university. The business curriculum's structure, which limited exposure to core business subjects until the sophomore year, compounded this issue. Recognizing these challenges, an interdisciplinary committee of faculty and staff was formed to design a course specifically for first-year business students. This course aimed to improve retention and graduation rates by fostering early academic engagement, community integration, and professional development.

### Core Learning Outcomes

The First-Year Experience (FYE) course is designed to prepare students with essential skills and mindsets. It emphasizes taking responsibility for academic success through effective study habits, time management, and active participation in campus life. The course also focuses on personal resilience, offering lessons in stress management, financial literacy, wellness, and fostering a positive, professional online presence. Students are encouraged to develop strong teamwork and leadership skills while considering their social roles and ethical responsibilities in a global context. Additionally, the program promotes a mindset of continuous learning, cultivating adaptability, critical thinking, and a curiosity for new ideas. Through a global business perspective, students explore how social, economic, and cultural factors shape the business landscape, preparing them for the complexities of today's professional environment.

### Experiential Learning and Community Impact Projects: Integrating PolyX Framework and High-Impact Practices

A key aspect of the First Year Experience (FYE) program is the integration of academic coursework with hands-on community projects, creating a blend of curricular and co-curricular learning opportunities. This approach is enhanced by the Polytechnic (PolyX) framework, which emphasizes experiential learning through a synergistic approach that interweaves interdisciplinary teamwork and collaborate learning with mentorship and community engagement. Table 1 summarizes the key elements of the PolyX framework:

**Table 1: PolyX Criteria**

Key Element	Description
Collaborative Learning	Students lead projects with faculty guidance
Global/Community Engagement	Involves active participation with a local or global community
Diverse and Multidisciplinary Perspectives	Encourages collaboration across different academic disciplines
Critical Thinking and Problem Solving	Includes reflections to build skills and competencies
Dissemination Beyond the Classroom	Project outcomes are shared publicly through various platforms
Creativity, Discovery, and Innovation	Solves distinct problems with innovative solutions
Intense Mentorship	Provides personalized, ongoing mentorship to address challenges

The PolyX framework provides students with the opportunity to address real-world challenges by engaging in projects related to the United Nations Sustainable Development Goals (UNSDGs), such as poverty reduction, environmental sustainability, and promoting social equity (Trejo and Preiser-Houy, 2023). These experiences allow students to apply theoretical knowledge in practical settings, fostering critical thinking and creative problem-solving skills.



PolyX projects, which are embedded within the FYE program, exemplify what the Association of American Colleges and Universities (AAC&U) defines as high-impact practices. High-impact practices are educational strategies that enhance student learning and retention, particularly through activities that involve deep engagement, such as collaborative learning and community-based projects (Kuh, 2008; Kuh and O'Donnell, 2013). The FYE's PolyX projects serve as a high-impact practice by engaging students in collaborative, real-world problem-solving while emphasizing mentorship and interdisciplinary approaches. This structured integration of experiential learning not only enhances students' academic performance but also contributes to their personal development, helping them build a sense of community and belonging.

Research on high-impact practices has shown that these educational experiences are especially beneficial for underserved student populations (Kuh and O'Donnell, 2013; Finley and McNair, 2013; Brownell and Swaner (2012). As Finley and McNair (2013) emphasize, students who engage in high-impact practices are more likely to experience deeper learning, improved retention rates, and increased academic success. The FYE program's focus on experiential learning aligns with these findings, providing first-year students with opportunities to develop essential skills early in their academic journey. By participating in PolyX projects, students engage with complex, real-world issues, often drawing on diverse perspectives and working in teams to develop solutions. This collaborative, hands-on approach is key to fostering intellectual growth and building critical competencies, such as leadership and teamwork.

Moreover, the intentional design of PolyX projects within the FYE program ensures that students are guided by experienced mentors who facilitate the learning process. This mentorship component, combined with the practical application of knowledge, makes PolyX a highly effective model for fostering student engagement and success. High-impact practices like these are known to contribute to greater student persistence and overall academic achievement, particularly for students from historically underrepresented backgrounds (Kuh and O'Donnell, 2013).

In summary, the integration of PolyX within the FYE program shows how high-impact practices can play an important role in enhancing student learning and success. By engaging students in interdisciplinary, community-focused projects, the program enriches their academic experience while helping them develop essential skills for professional and civic leadership. This experiential learning approach prepares students to navigate complex societal challenges and contribute meaningfully to their communities and beyond.

### **Workshops and Mentorship**

In addition to project-based learning, the FYE program incorporates workshops and mentorship, both of which are elements of high-impact educational practices. The workshops offered through FYE help students develop essential academic and professional skills, ranging from time management and study strategies to the use of digital tools for data analysis and research. These workshops not only support students in becoming more proficient in technical skills but also enhance their ability to engage deeply with academic material. According to the AAC&U, high-impact practices, such as skill-building workshops, are known to increase student engagement and foster higher levels of learning (Kuh, 2008; Finley and McNair, 2013).

Furthermore, mentorship within the FYE program plays a pivotal role in student success. Pairing students with faculty members as well as professional advisors creates an intentional, structured support system, providing guidance on both academic and personal challenges. Research has shown that mentorship relationships are one of the most effective practices, particularly for first-year students, as they help cultivate a sense of belonging and connection to the institution (Finley and McNair, 2013). This sense of belonging is crucial for retention and academic success, especially among underserved populations. The mentorship component ensures that students have a reliable resource for navigating the challenges of college life, thus enhancing their overall academic experience.

### **Community Engagement and Ethical Leadership**

The FYE program places a strong emphasis on community engagement and ethical leadership, core elements that align with the AAC&U's framework for high-impact practices. Students are encouraged to participate in community service initiatives, developing a sense of social responsibility and helping them reflect on the ethical dimensions of business decisions. By connecting classroom learning to real-world societal challenges, such as economic inequality and environmental sustainability, the FYE program deepens students' understanding of the broader implications of their professional actions.

High-impact practices, such as community-based learning, have been shown to enhance students' ability to apply their knowledge in meaningful ways that benefit both themselves and society. These experiences cultivate ethical reasoning

and civic engagement, preparing students to become responsible leaders who can address the complex challenges facing society (Finely and McNair, 2013). Through FYE's focus on ethics and leadership, students are better prepared to think critically about their role in promoting social and environmental justice in their future careers.

### **Impact on Student Development**

The FYE program integrates curricular and co-curricular experiences to make a meaningful contribution to student development, showing how high-impact practices enhance learning. Students benefit from a holistic approach that strengthens their academic skills while fostering a professional identity grounded in ethical leadership and social responsibility. Through project-based learning, workshops, mentorship, and community engagement, the program provides students with the skills and resources necessary for academic and professional success. By focusing on both academic and personal growth, the FYE program helps students develop the perspectives and abilities needed to address real-world challenges, preparing them for success in their careers and personal lives.

Building on the foundational skills developed in the FYE program, students continue their co-curricular engagement as they progress into more specialized and discipline-specific opportunities at the academic department level. These departmental initiatives provide a deeper focus on applying theoretical knowledge to practical, real-world contexts, fostering further growth and development throughout students' academic journey. The following section explores how co-curricular activities at the academic department level enhance student learning and contribute to career readiness.

## **CO-CURRICULAR EXPERIENCES AT THE ACADEMIC DEPARTMENT LEVEL**

In the CBA there are six academic departments that include Accounting, Computer Information Systems, Finance, Real Estate and Law, International Business and Marketing, Management and Human Resources, and Technology and Operations Management. At the department level, co-curricular activities provide students with specialized opportunities to apply theoretical knowledge in hands-on, real-world contexts, significantly contributing to both personal and professional development. Faculty and staff offer students across disciplines a broad range of co-curricular experiences in alignment with the AACSB's core tenets of Engagement, Innovation, and Societal Impact. These activities, such as interdisciplinary and community-focused projects, allow students to enhance their academic competencies while developing professional skills essential for their future careers.

Through these department-level initiatives, students are not only gaining practical insights but are also participating in experiences that reflect high-impact practices. Such practices foster engagement, critical thinking, and collaborative problem-solving, which, in turn, positively affect academic achievement and student retention.

### **Program Development and Rationale**

Each department within CBA has developed unique co-curricular experiences to address specific student and industry needs. These initiatives are intentionally structured to provide students with experiential learning opportunities that extend beyond traditional classroom instruction. Through partnerships with industry, applied projects, and professional certifications, faculty are helping students build the skills needed to succeed in competitive business environments.

The rationale for these programs is based on the recognized need to provide real-world applications of business concepts, ensuring that students can transition smoothly from academic to professional settings. In line with the AACSB's emphasis on engagement, faculty strive to create meaningful interactions between students, alumni, industry professionals, and community members thus bridging the gap between theory and practice.

### **Core Learning Outcomes**

Across departments, several key learning outcomes have been identified as crucial to student development:

#### *Professional Skills Development*

Co-curricular experiences help students develop industry-relevant skills such as project management, data analysis, and digital tool proficiency. For example, students participate in projects like the Cybersecurity Training System, which offers intensive, hands-on experience in cybersecurity competitions, improving technical skills and career prospects.

### *Ethical Leadership and Social Responsibility*

Many department-level programs incorporate societal impact projects, particularly those addressing the United Nations Sustainable Development Goals (SDGs). For example, students engage in sustainability-focused projects, such as collaborating with urban farms and solar energy initiatives. These experiences foster a deeper understanding of business's role in solving societal challenges.

### *Collaboration and Teamwork*

Co-curricular activities often involve teamwork and community engagement, requiring students to collaborate on projects that address real-world business scenarios. One example is the Volunteer Income Tax Assistance (VITA) program that provides students with the opportunity to work in teams while offering tax preparation assistance to local communities, enhancing both technical and interpersonal skills.

### **Innovation and Leadership Development**

Innovation is a core aspect of departmental co-curricular programs. For example, students learning about Computer Forensics engage in real-life forensic investigations using industry-standard tools. This type of engagement encourages leadership development by requiring students to present their findings and collaborate on building a comprehensive “textbook” of forensics knowledge by the end of the semester. Furthermore, the Global Supply Chain Challenge initiative engages students in solving complex supply chain issues in a competitive setting, enhancing their problem-solving and leadership abilities.

### **Student Clubs as a Pathway for Co-Curricular Engagement**

Student clubs play an important role in the co-curricular ecosystem, offering students opportunities for professional development, networking, and hands-on learning outside the classroom. These clubs allow students to engage more deeply with their fields of study, collaborate with peers, and connect with industry professionals. By building key skills and networks, student clubs help students prepare for future career success.

### *Interdisciplinary Learning and Skill Development*

Student clubs such as the one with a focus on the Future of Technology offer high-impact experiences that bridge theory and practice. The club's involvement in cybersecurity competitions and development of the Cybersecurity Training System has led to substantial student engagement, with participation growing from 100 students annually to over 600.

Through weekly co-curricular training and participation in national and international competitions, students develop skills such as problem-solving, collaborative learning, and technical proficiency, all while increasing their job prospects and industry exposure. The club's emphasis on real-world applications makes it a key pathway for enhancing students' employability.

Similarly, the Application Engineering and Learning Initiative (AELI), provides bootcamp training for certifications such as the Java Foundation Certification. Through club activities, students sharpen their coding, project management, and collaborative skills, gaining hands-on technical experience that gives them a competitive edge in the job market.

### *Networking and Industry Connections*

Many student clubs foster strong connections between students and industry professionals. For example, the Audit and Control Association club regularly organizes events and training sessions where students network with industry experts in cybersecurity and information systems auditing. These events provide career advice, expose students to current industry trends, and enhance their understanding of cybersecurity practices. Through active participation, students gain technical knowledge while building valuable industry connections that can facilitate internships and job placements.

### *Leadership and Personal Development*

Student clubs also offer students the chance to develop leadership skills and foster a sense of community. The clubs are student-led, providing opportunities to take on leadership roles, organize events, and manage projects. These experiences cultivate skills in leadership, communication, and organization. For example, the Volunteer Income Tax Assistance (VITA) program, supported by student clubs, engages students to apply their academic knowledge while developing interpersonal skills, ethical responsibility, and a strong sense of civic duty.

### *Equity, Diversity, and Inclusion Initiatives*

Many student clubs actively promote equity, diversity, and inclusion (EDI). For example, several clubs work to engage underrepresented groups in STEM fields through initiatives such as the Women in Industry panel discussions. These events focus on addressing the challenges and opportunities for women in business and technology, helping to foster career readiness and creating a more inclusive environment for all students. Such clubs play a critical role in ensuring that underrepresented student populations have access to the mentorship and resources they need for academic and professional success.

### **Impact of Co-curricular Engagement on Student Success and Development**

Departmental-level co-curricular initiatives have a strong impact on student success, professional development, and personal growth. These experiences develop essential skills like teamwork, critical thinking, and leadership, aligning with the AAC&U's High-Impact Educational Practices, which have been shown to foster deeper learning, support student retention, and improve graduation rates (Kuh, 2008; Brownell and Swaner, 2012).

In addition to professional competencies, co-curricular activities foster personal growth and a deeper understanding of ethical responsibilities. Programs like VITA and other community service projects expose students to the social impact of business, encouraging them to reflect on the broader societal implications of their decisions. These activities strengthen students' sense of civic responsibility while preparing them for leadership roles.

Additionally, co-curricular opportunities provided through student clubs directly support student success. Participation in these activities helps students develop a wide range of skills that complement their academic learning, such as critical thinking, teamwork, leadership and professional ethics. Research shows that students who engage in co-curricular activities, such as those that may be offered through student clubs, experience a stronger sense of belonging, which is directly linked to higher retention rates and academic achievement (Sá, 2023). For example, Sá (2023) emphasizes that extracurricular involvement, alongside academic participation, is crucial for students' integration into higher education, aiding in both personal and professional development and increasing their persistence within the institution.

By engaging in collaborative, interdisciplinary projects and activities outside of the classroom, students build meaningful connections with peers, faculty, alumni and industry professionals, reinforcing a supportive academic community and strengthening their sense of belonging. Furthermore, co-curricular programs promote equity, diversity, and inclusion by providing students with opportunities to work on projects that address global challenges such as social justice and sustainability. Additionally, mentorship is another critical element of these initiatives, as faculty guidance helps students refine both their academic and personal skills, thus providing them with the support they need to thrive.

In summary, departmental co-curricular initiatives provide a well-rounded educational experience that helps ensure students gain the skills, knowledge, and confidence needed to succeed in both their academic and professional lives. By offering real-world applications of business concepts, fostering mentorship, and promoting equity, diversity, and inclusion, these co-curricular engagements prepare all students—and especially those from historically underrepresented backgrounds—with the tools to succeed academically and professionally, thereby enhancing overall student success.

### **Key Success Factors**

Several key factors contribute to the effectiveness of department-level co-curricular experiences in fostering student development and academic success. These include strong industry partnerships, interdisciplinary collaboration, and active faculty involvement, all of which create a dynamic learning environment.

Collaborations between academic departments and industry leaders expose students to current trends and real-world projects, enhancing their practical knowledge, employability, and readiness for the workforce. These partnerships also offer mentorship opportunities, bridging the gap between academia and industry.

Furthermore, collaboration between different departments fosters diverse perspectives and critical thinking. By working on interdisciplinary projects, such as PolyX initiatives addressing global challenges, students develop problem-solving skills that mirror real-world, cross-functional business environments.

Faculty play a vital role as mentors, guiding students through research projects, and industry collaborations. Their expertise ensures that co-curricular activities align with academic and professional standards, while their mentorship helps students navigate challenges, continuously refine their skills, and grow both academically and professionally.

As faculty mentorship plays a pivotal role in many co-curricular activities, similar guidance is also integral to the opportunities offered through specialized centers, such as the Center for Innovative Analytics. This center extends the collaborative learning environment by providing students with advanced, hands-on experiences in data analytics and industry-driven projects. The following section explores how the Center for Innovative Analytics enriches student learning through interdisciplinary partnerships, mentorship, and real-world applications.

## **CO-CURRICULAR EXPERIENCES VIA A CENTER FOR INNOVATIVE ANALYTICS**

In this section we highlight our experience with using a Center for Innovative Analytics as a hub to offer a range of co-curricular experiences for students, through experiential learning projects in collaboration with industry and community partners, opportunities to showcase student work at conferences and symposiums, and skills-based workshops on analytics tools. The center was launched thanks to a generous donation from alumni, with the mission to empower the next-generation workforce with visualization and analytics skills needed to enhance organizational effectiveness by transforming data into actionable insights. A primary goal of the center is industry and community engagement and partnerships: bringing together faculty, students, and practitioners to collaborate on real-world data analytics projects in cross-disciplinary teams. The center has an Advisory Board of industry professionals who collaborate with faculty on center initiatives. It also has a Visual Analytics Lab, providing a dedicated space for students to collaborate and work with faculty and professionals. The lab is equipped with computers, interactive displays, and collaborative workspaces.

### **Industry and Community Partnership Projects**

These partnership projects are a cornerstone of the center's mission. Students work in teams of 5-6 students with guidance from faculty advisors and mentorship from the industry and community partners, and the projects culminate with final presentations to the partner organizations. Benefits to students include experiential learning using real-world data, learning analytics tools and techniques, and developing leadership, teamwork, and communication skills. Center projects have been interdisciplinary, spanning multiple departments in the College of Business and students from other colleges.

Examples of center partnerships include:

- A partnership with Boeing on a variety of analytics challenges, ranging from using augmented reality for real time object classification to focusing on various aspects related to aircraft corrosion, including analysis of aircraft corrosion risk, and text classification of aircraft maintenance data.
- A partnership with the City of Pomona centered on community solutions for homelessness, and on rental affordability and tenant protection strategies.
- A partnership with Meta Reality Labs on supply chain analytics including segmenting retail stores, forecasting store level sales, and developing store level inventory stocking policies to maintain desired service levels.
- An internal partnership with University Advancement on analyzing alumni engagement and giving data to develop statistical models to help predict who the donors are likely to be, and to predict donation amounts.

The hallmarks of these projects are:

- Real-world projects using real-world data provided by the partner organizations, supplemented with publicly available data
- Work in cross-disciplinary teams in a collaborative learning environment
- Student-led, with guidance from faculty and partner organization mentors
- Regular meetings and check-ins with mentors
- Culminating presentations to partner organizations
- Use of analytics software, e.g., programming using Python and R, geocoding and mapping using ArcGIS, and data exploration and visualization using Tableau

### *United Nations Sustainable Development Goals (UNSDGs)*

The center has undertaken projects related to UN Sustainable Development Goal 10: Reducing Inequalities.

- Students working on an analytics project with the City of Pomona used the Social Equity Analysis Solution tool (in ArcGIS software) to analyze community characteristics and generate an equity analysis index based on seven key demographic and socio-economic variables to identify areas in Pomona most vulnerable to housing insecurity. They analyzed inequalities in income and rent burdens, and other key variables that spotlight the problem of homelessness in the community, highlighting areas in the city where government action would be of most benefit in reducing inequalities.
- Students working on another analytics project incorporated sustainability metrics and consideration of opportunity zones in their analysis while identifying parcels of land in the city for affordable housing development. They considered opportunity zones (economically distressed areas), and several factors related to sustainability, for example, proximity to facilities such as transit, healthcare, and grocery stores; and on criteria related to ‘healthy places’, such as education, job opportunities, and clean air and water; with a view to reducing inequalities in access.

### **Workshops on Analytics Tools**

The center regularly offers hands-on workshops on analytics tools, specifically Tableau and GIS (Geographic Information Systems). These are at no cost to students, often offered in collaboration with a student club, and are a way for students to gain key in-demand skills that they may not get in the curriculum unless they take specific courses. For example, in the Tableau workshops, students learn to create visualizations and animations, analyze data sets, and build interactive dashboards, with the overall goals of deriving insights from data and storytelling with data. The datasets for the workshops are derived from publicly available sources of real-world data.

The center plans to enhance the hands-on workshop offerings by offering digital badges to students who complete specific deliverables associated with the workshops. A proposed three-level digital badging curriculum (with each level building on the previous one) for Data Visualization Using Tableau is outlined below:

- Level 1 – Explorer:
  - Introduction to Data Visualization
  - Basic principles of design in creating visualizations
  - Overview of visualization software e.g., Tableau and Power BI
  - Import data into Tableau (real-world, publicly available data sources)
  - Create simple visualizations using graphs, charts, and tables
  - Create maps from the data
  - Use interactive filters to explore different views
  - Ethical considerations in data visualization
- Level 2 – Implementer:
  - Join multiple data sets using primary keys
  - Use calculations/calculated fields for enhanced analysis
  - Explore relationships between variables and predictive analytics
  - Create animations, for example, to show trends over time
  - Basic principles of dashboard design
  - Build interactive dashboards
- Level 3 – Master:
  - Create advanced visualizations
  - Understand the integration of AI tools in Tableau
  - Principles of effective storytelling with data
  - Create a Tableau Story
  - Complete and present a comprehensive project to include creating a Tableau Story that incorporates key elements from the prior learnings in the series, using new/different real-world datasets

### **Sponsorship of Data Analytics Competition**

The center sponsored a data analytics competition hosted by a student club on campus in 2023. In this co-curricular opportunity, student teams (acting as consultants) worked on a case study for three weeks, with deliverables including a written report and a presentation. The competition culminated with teams presenting their analysis and recommendations to a panel of judges. The center plans to continue to support competition opportunities for students.

### **Presentations of Student Research at Conferences and Showcases**

Students working on center projects have presented their research at conferences and showcases including at the University's Research, Scholarship, and Creative Activities (RSCA) Conference, the University's Geographic Information Systems (GIS) Day celebration, the University's PolyX (Signature Polytechnic Experience) Showcase, and the College of Business Administration's Showcase. These are opportunities for students to further develop their presentation and communication skills.

### **Annual Center Symposium and Reception**

In May 2023, the center started a tradition of organizing and hosting an annual center symposium and reception. This was followed by the second annual symposium in May 2024. These events are designed to showcase center partnership projects, and to hear from and engage with industry experts. Attendees include current and former students involved with center projects, industry guest speakers, industry and community partner mentors and representatives, center advisory board members, and faculty. Students present their research, and industry guest speakers share their expertise and insights. The symposium is followed by an informal reception which provides networking opportunities for our students. This is expected to become an annual tradition, with broadening reach.

### **Student Reflections and Feedback**

Student feedback on the co-curricular experiences offered by the center has been consistently positive. In particular, students working on industry and community partnership projects in small groups appreciate the opportunity to gain key skills and build relationships with peers, faculty, and industry and community mentors. They also appreciate having 'ownership' of the projects and making key decisions about the shape and direction of projects. From some of the student reflections, "I appreciated the collaboration we shared amongst the students...we had mutual respect and understanding that allowed us to trust and rely on each other", "working with people from different colleges and majors gave me a new perspective on the issue", "I know my experience with the tools I learned will give me an advantage when applying to new endeavors focused on data analysis", "I developed more communication skills, and started to become more open and vocal", "the methods are important within your analytics team, but the end goal is to present to people outside of your team. Visual analytics is an art and science – how do you best relay your findings and effectively communicate whatever you're analyzing? Businesses want information in a readily available format, and they trust that you applied the right methods".

### **Summary of Center's Contributions**

According to the future of jobs report from the World Economic Forum (2023), analytical thinking and creative thinking are the most important skills, with analytical thinking considered a core skill by more companies than any other skill and being the highest priority for skills training through 2027. In a recent article from the World Economic Forum (Whiting, 2024), reskilling, upskilling, and lifelong learning will be key to managing the impact of AI. Through experiential learning partnership projects with industry and community, students have opportunities to develop their analytical, problem solving, communication, project management, and collaborative learning skills while delivering insights that contribute to addressing partner organization's challenges. Students also benefit from the mentorship provided by the close relationship with the partner organizations. Specific projects related to homelessness, housing insecurity, and affordable housing speak to the UN Sustainable Development Goal of reducing inequalities. The center continues to provide opportunities to showcase student work and enhance the career-readiness of students, and workshops offered by the center help students add to their skills toolkit. Students who have worked on projects through the center have often pursued careers in analytics, or advanced degrees, including undergraduate students returning to the university for graduate work. Further development of AI and related competencies will help the center continue to support students' professional growth.

## **CONCLUSIONS**

This case study highlights how co-curricular opportunities enhance the educational experience of business students at a large regional public university. These initiatives, integrated throughout the student journey—from the First-Year Experience (FYE) to departmental programs and the Center for Innovative Analytics—provide a comprehensive

framework grounded in experiential learning and the PolyX model. By integrating academic learning with hands-on, practical application, these programs prepare students to navigate professional challenges and the evolving demands of the workforce.

The findings emphasize the development of essential skills—leadership, analytical thinking, and ethical decision-making—through interdisciplinary projects, industry partnerships, and experiential learning. These co-curricular activities serve as high-impact practices that enrich students' learning experiences beyond the classroom and significantly enhance career readiness. Moreover, these initiatives contribute to strengthening institutional retention and success rates, particularly among historically underrepresented groups, by fostering a sense of belonging and equitable access to experiential learning. Students have reported increased confidence, improved communication skills, and stronger connections to their academic community, all crucial factors in promoting persistence and academic achievement.

Furthermore, aligning co-curricular projects with the United Nations Sustainable Development Goals (SDGs) reflects the university's commitment to societal impact and ethical leadership. Projects addressing real-world challenges, such as homelessness and housing affordability, not only provide students with valuable problem-solving skills but also instill a deepened sense of social responsibility.

Future research offers valuable opportunities to further explore the adaptability and impact of co-curricular integrations across different institutional contexts and disciplines. Expanding the study to include a wider range of universities and educational models would offer important insights into how other institutions might implement or modify similar experiential learning frameworks, like the PolyX framework, to advance their unique missions and promote student success.

Another area for future research is the deeper investigation of the long-term outcomes of co-curricular experiences, particularly in terms of career progression, adaptability to evolving workforce demands, and sustained civic engagement. Longitudinal studies that track graduates' professional development and societal contributions could offer a more thorough understanding of the lasting effects of these initiatives as students transition into their careers and community roles. Such studies could further expand the growing body of knowledge on the enduring benefits of co-curricular programs in higher education.

In conclusion, integrating co-curricular experiences within business education offers a comprehensive approach to preparing students for the complexities of the modern workforce and society. By complementing curricular learning with real-world applications, higher education institutions can enhance student competencies, engagement, and readiness for future challenges. The insights from this case study contribute to the growing body of literature on experiential learning and co-curricular integration, offering a model for other universities to innovate their educational practices. As workplace demands continue to evolve, such integrative approaches will be essential in shaping adaptable, skilled, and socially responsible business professionals.

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# Diversity, Equity, and Inclusion at a Pervasively Sectarian University: College-going Experiences of Students with Hearing Disabilities

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## ABSTRACT

This qualitative research project delves into the college-going experiences of students with hearing disabilities within the context of a pervasively Christian sectarian university (PCSU). In the academic and social landscape of higher education, students with hearing disabilities often encounter unique challenges that remain unaddressed and unrecognized by peers, faculty, and administrators. The primary objective of this study is to shed light on the experiences of students who are deaf or hard of hearing (D/HH) with specific focus on their encounters at PCSU and to explore ways in which diversity, equity, and inclusion (DEI) initiatives could mitigate marginalization. The study employs a series of interviews with D/HH students to learn about their narratives throughout their academic journey. Through phenomenological inquiry, recurring themes emerge, offering insights into the intersections of disability, educational access, and the university's Christian mission. The findings revealed key themes including a lack of awareness of DEI initiatives among D/HH students, the significance of the university's Christian mission on their experiences, and concerns regarding the efficacy of campus resources. The implications of this study advocate for targeted DEI initiatives tailored to the needs of D/HH students, including educational programs on disability rights and campus accessibility as well as accommodations for various classroom difficulties. The research calls for comparative studies across university settings and explores the college-going experiences of students with other disabilities. Ultimately, this research contributes to ongoing dialogue about inclusive practices in higher education, aiming to create more equitable environments for students with disabilities.

**Keywords:** hearing disability, diversity, equity, inclusion, higher education

## INTRODUCTION

Students with hearing disabilities may potentially be marginalized throughout college, facing unspoken challenges about which other students, teachers, and administrators may not know. This study highlights the college-going experiences of students with hearing disabilities at a pervasively Christian sectarian university (PCSU). The goal of this study is to create awareness of the college-going experiences of students that self-identify as deaf, hard-of-hearing, hearing impaired, or hearing disabled. This research project also aims to explore areas of organizational change that could allow PCSU to better embody its Christian mission. The research questions of this study were the following: How does a hearing disability affect the college-going experiences of deaf or hard-of-hearing (D/HH) students? How has PCSU encouraged or hindered the academic and social development of D/HH students? In what areas (if any) do D/HH students at PCSU feel that PCSU could implement diversity, equity, and inclusion (DEI) initiatives to benefit D/HH students? This research promotes the understanding of hearing disability and advocates for change, equality, and awareness by listening to those who experienced hearing disability while they attended PCSU.

## PREVIOUS RESEARCH

### Diversity, Equity, and Inclusion

Diversity, equity, and inclusion initiatives are important aspects of decision making for many organizations, corporations, and institutions which strive to better represent minorities. *Diversity* includes differences and representation in culture, gender, race, or ethnicity. *Equity* is the idea that individuals or groups may require need-based support to avoid the structural barriers that exist for contribution to their particular entity. *Inclusion* is relative to society, for which the overall goal is for the individual to find a niche in his or her social realm. Higher education involves DEI management decisions to “find new ways to enable people from various backgrounds to find their place in higher education” (Claeys-Kulik, 2019). Finding a place means higher educational systems must position themselves to be accessible for all students, regardless of background or demographics, which requires universities to know areas in which students are in need and develop action plans based on that need. For example, one component of DEI that is unfairly overlooked is hearing disability (Pulrang, 2021).

### Framework for Higher Education

Universities are institutions heavily influenced by their surrounding cultures with the responsibility of serving as vessels for training in a growing number of professions, specializations, and certifications. Obtaining a degree from a university is a pathway to elevated social status and often to a particular job, as United States society places tremendous importance on attending and graduating from a university. To be accessible, universities must employ administrative processes that grant access to students of different backgrounds, genders, and disabilities. The framework of higher education establishes administrative processes for all students, but students with disabilities have heavier burdens due to the additional processes that accompany their disabilities (Coughlin, 2018). Access to higher education can be recognized through the implementation of DEI initiatives to “meet specialized needs” and serve a more diverse range of populations (Altbach, 2011).

In the United States, demographics are ever changing, and new identity groups emerge, forcing into light the pressing topics such as DEI initiatives. Students enrolled in universities today experience institutional power which primarily encompasses the privilege of access to higher education and can be seen in the classroom or organizational framework in addition to community or involvement on campuses. Institutional power can also be felt through the assertion or representation of oneself in those respective areas. In contrast, marginalization is the refusal or inexperience of this power within a university (Lee, 2015). Higher education plays a fundamental role in reshaping society through diversification, and a study examining the framework for higher education asserts that

Developing the capacity for diversity will require, among other things, engaging deeply with the mission, including being able to link diversity with excellence; framing diversity in ways that are both inclusive and differentiated; building human capacity; and mounting an intentional effort to monitor progress. (Altbach, 2011)

Higher education is different from businesses, governments, and other organizations because of its complex arrangement of history, mission, technology, and responsibilities, and administrative applications of this arrangement are often challenging. The “production process” in higher education is muddled by differences in students who may have varied interests, skills, and learning abilities as well as backgrounds and beliefs. For example, curriculums for a degree may differ in content learned, time required, and activities performed. In addition, teaching methods vary among chosen scholastic disciplines and preferred styles of professors, contributing to the unique levels of student development within the higher educational system (Gallos, 2011). For PCSU specifically, the complexities in higher educational framework have an additional layer due to the university’s commitment to the cause of Christ, and DEI initiatives are necessary for PCSU to carry out its Christian mission.

### **Organizational Change Theory**

Developing an institutional framework that includes initiatives for diversity, equity, and inclusion for students with hearing disabilities may require organizational change. A shift for large organizations may be difficult, as many variables are involved in recreating culture. Kurt Lewin developed a model for organizational change that became known as Lewin’s Theory of Planned Change, and it serves as a “strategic resource to mobilize the people side of change” (Shirey, 2013). The success of the shift depends heavily on the competence, abilities, and willingness of the people in the organization. As such, people are the factors of this change and therefore must be involved and motivated to move the organization to the “desired future state” (Hussain, 2016). The model developed by Lewin has three phases: unfreezing, changing, and refreezing (Shirey, 2013).

The first step, unfreezing, requires the recognition and identification of a particular aspect of the organization that needs to be changed. Leaders must prepare for this change by developing action plans and communicating the desired outcomes of the change (Shirey, 2013). The action plan needs to include activities, events, and a path for organizational change (Hussain, 2016). This step of Lewin’s model is met with the most resistance, which can be reduced by creating urgency among the people in the organization as well as opening avenues for involvement in the plan (Shirey, 2013). Continuous communication with avenues for feedback allows organizations to minimize resistance to change, and incentives may also encourage the people in an organization to respond to the call for change.

The second step—changing—requires leaders to affirm responses and introduce the new policies or behaviors to their organization. Continuing to keep people involved creates positive feelings toward the change, and allowing people to contribute creates a sense of achievement and motivation. The changing phase involves going through the activities and events. In addition, people in the organization whose dedication to the change is essential must be identified (Hussain, 2016). When the change has been made, phase three—refreezing—begins. The goal of this stage is to stabilize the shift “so that it becomes embedded into existing systems such as culture, policies, and practices” (Shirey, 2013). Refreezing is important to ensure the organizational shift is lasting and effective. Organizations must

understand the imperative to develop their services and structures to best support the needs of their customers and users, and leaders of organizations carry the most responsibility for implementing this type of planned change. Lewin's model for organizational change is one plan that can be used to achieve a desired shift.

### **Disability Services and Accommodations at PCSU**

PCSU claims that its moral responsibility and legal imperative, in addition to Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, motivate the institutional accommodations established for students with disabilities. PCSU has developed a Disability Services Handbook which further specifies the legislation, qualifications, and processes for the rights and duties of both the university and the student. Noted in the Disability Services Handbook, the mission of the Office of Student Disability Services at PCSU is to establish a campus that “fosters academic excellence, personal responsibility, and growth in students with disabilities” by focusing on the accessibility of its programs and activities for the entire population of PCSU (PCSU, “Disability Services,” 2022). PCSU asserts that the core curriculum and academic standards will not be omitted or significantly changed because of a disability; rather the university will work to assist “qualified students with disabilities” (PCSU, “Services and Procedures,” 2022) to meet objectives through reasonable accommodations. For a student to be considered for accommodations, he or she must obtain and present current documentation that confirms his or her disability and includes recommendations for accommodations from a medical professional or licensed clinician. Once a student obtains this information, he or she must meet with Student Counseling and Disability Services (SCDS) to make the university aware of the disability and to receive any potential accommodations.

### **Hearing Disability Terminology and Context**

Hearing disability falls into the category of underrepresented research, and those with hearing disability often encounter important but quiet challenges every day (Hogan, 2016). Moreover, disability is not only highly prevalent in the workforce today, but it is also an important and often overlooked aspect of creating diversity, a pressing initiative in the current society (Huyck, 2021). Because the deaf or hard-of-hearing community is represented by many different people, terminology, identifications, and qualifications have some variation depending on personal preference, age of onset of hearing disability, and educational background. All people have autonomy over their own self-perspective, and they can choose the culture or community with which they want to identify based on their own opinions (Community and Culture, 2022).

While descriptions and words exist to describe different types of hearing loss, a few terms exist to standardize overall understanding of the hearing disability. First, *hearing impairment* refers to the “abnormality of structure or function that is physiological, psychological, or anatomical” and could also be defined as a “problem with hearing that is categorized by decreased sensitivity to sound in comparison to normal hearing” (Dr. G. Russell, personal communication, April 6, 2022). *Hearing-impaired* is now often considered a negative term because it suggests that people are not able to accomplish goals or complete certain tasks. Also, the term conveys the idea that something is damaged and/or below the standard, an idea that upsets people who do have a hearing disability. As a result, *hearing-impaired* can be an improper way to describe someone who has a hearing disability (Community and Culture, 2022). *Hearing disability* is the “difficulty in performing socially useful functions due to hearing loss,” and slightly different is *hearing handicap* which is the “way in which a hearing loss has a frustrating effect on individual roles or goals” (Dr. G. Russell, personal communication, April 6, 2022). The participants in this study self-identify with one or more descriptions as they noted in the interview. They may classify themselves as deaf, hard-of-hearing, hearing impaired, or hearing disabled. The participants of this study can hear with a hearing aid or assistive device as opposed to the Deaf community which considers “hearing loss as a key part of their personal identity and often use sign language as a primary form of communication” (Huyck, 2016).

For the purposes of this research, the term *deaf or hard-of-hearing* (D/HH) will be used to identify the qualities of students whose voices were highlighted. D/HH is an objective and inclusive term that does not diminish the individual or make assumptions about the abilities or integrity of a person. The National Association of the Deaf (NAD) asserts that being deaf is not a disability but instead a cultural identity; however, the NAD does hold that “it is necessary to utilize the current legal framework which extends rights and protections to people with disabilities to achieve equal rights” (National Association of the Deaf, 2022).

## **RESEARCH DESIGN**

### **Research Questions**

Lewin's Theory of Planned Change is the perspective through which the research questions are developed. This research project explores the following questions: How does a hearing disability affect the college-going experiences of D/HH students? How has PCSU encouraged or hindered the academic and social development of D/HH students? In what areas (if any) do D/HH students at PCSU feel that PCSU could implement DEI initiatives to benefit D/HH students?

### **Methodology**

The study employs a qualitative methodology of research which consists of a series of interviews to highlight the stories of D/HH students from PCSU. Their stories included their college-experiences based on curriculum, extracurricular activities, and perceived development of soft skills as well as their relationships with students and professors. From their lived experiences, the researcher analyzed and organized repeated themes of their voices, developing them into a case study. The case study includes details about the interviews as well as the conclusions the researcher uncovered while employing phenomenological inquiry. In addition, the researcher reviewed the mission of the university and any DEI initiatives and compared the mission to the experiences of participants to expose potential areas of weakness to break down barriers that separate students with hearing disabilities.

### **Nature of Data Collection**

The participants of this study are students currently enrolled at PCSU or graduated from PCSU who qualify as deaf or hard-of-hearing from the guidelines maintained by PCSU. The researcher contacted the potential participants through the Student Counseling and Disability Services at PCSU. Due to the lack of contacts from the office of SCDS, the researcher also employed snowball sampling, which is methodology for obtaining participants that relies on "networking and referral" (Parker, 2019). Most of the participants of the study became involved as a result of snowball sampling. The researcher conducted the interviews and followed a question guide. The participants were assured that personal identifiable information would remain confidential, and they were encouraged to volunteer information or experiences at their own discretion. Conversations were recorded, allowing the researcher to ensure the voices of participants would be available for reference during the analysis process. Lastly, the data collected from these interviews were securely kept in a locked computer, and when the study was completed, the data were destroyed.

### **Phenomenological Inquiry**

Phenomenological research is "a deep investigation of what experiences mean to people" (Bliss, 2016), and keeping experience at the core, phenomenological inquiry seeks to uncover the meaning and perception of personal stories. To engage in this qualitative style of research, the researcher must focus on gathering details of an experience to "provide a basis for reflective structural analysis" (Bliss, 2016) that will expose the reality of the situation. The goal of this study is to listen to the college-going experiences of students with hearing disabilities with the purpose of eliminating marginalization at PCSU by creating awareness and advocating for change. The voices of students with hearing disabilities are essential to this research because their perspectives provide untreated data from which to develop conclusions and promote change. Potential organizational changes were addressed using Lewin's Theory of Planned Change. Possible suggestions for change include creating safe spaces for feedback from D/HH students, forming a group or task force that identifies marginalization, establishing mentorships with students and teachers to improve the overall college experiences of students with hearing loss, and creating awareness among the campus about this pressing issue.

## **FINDINGS**

The stories of D/HH students at PCSU were analyzed for repeated themes to address questions related to the college-going experiences of D/HH students. From the findings, potential DEI initiatives for students with hearing disabilities were recommended. The data analysis revealed three themes of the study. First, D/HH students at PCSU are not aware of diversity, equity, and inclusion initiatives or the movements that accompany the initiatives. The participants asked the researcher to give a thorough definition of the individual words in addition to the relationship between the words. Second, the voices of D/HH students at PCSU emphasized the influence of the Christian mission and atmosphere of PCSU on their experiences. The participants told stories about the impact of students and teachers who embodied Christian values, contributing to D/HH college-going experience. Third, D/HH students detailed their experiences with the Student Counseling and Disability Services, revealing negative sentiments toward this campus resource. The

participants” stories about the SCDS were consistent and provided an opportunity for potential recommendations for change.

### **Theme 1: Unawareness of Diversity, Equity, and Inclusion**

In each conversation, the researcher found the participants were not aware of diversity, equity, and inclusion movements or initiatives. To foster understanding, the researcher gave the participants an overview of the definitions of diversity, equity, and inclusion as well as examples of relevant initiatives that have been implemented in areas with which each participant would be familiar. Once the researcher explained the substance behind DEI and the initiatives that could be implemented using DEI, each participant expressed that he or she felt as though hearing disability has a place in those initiatives. One participant further noted the importance of implementing specific initiatives for individual needs rather than a blanket accommodation for disabilities. He explained that every person is different, and accessibility is the most important aspect of cultivating equal opportunity for students with disabilities. Another participant added that it is “very important to have resources” that are designed to help students with individual needs as those needs present themselves.

Diversity, equity, and inclusion initiatives are becoming important for institutions as student demographics continue to change and as the imperative increases for universities to provide equal access for all students. The repeated theme of unawareness of DEI and DEI initiatives revealed the potential benefit of spreading awareness so that students with disabilities may be better represented among higher education. In addition, each participant furthered the idea that hearing disability is a necessary part of DEI, saying that disabilities for students “involves experience with the world around them” contributing to disability-related “restrictions placed on them in society;” therefore, hearing disability does belong as a part of the movements for diversity, equity, and inclusion.

### **Theme 2: Christianity in Diversity, Equity, and Inclusion**

The voices of D/HH students emphasized the connection between the Christian mission of PCSU and the college-going experiences of D/HH students. The mission at PCSU states that the “university strives to recruit students who demonstrate excellence in scholarship, leadership, and church/community involvement,” and it values “the integration of faith and learning throughout the educational process” (PCSU “Vision and Mission,” 2020). Each participant shared their stories that connected faith and their experience at PCSU, and the researcher found that each participant acknowledged the significance of the Christian calling to look for ways to love others, specifically through these DEI initiatives.

One participant, in choosing a university to attend, said that she was looking for a “Christian university,” saying her faith is important to her, and she added, “I know that God has played such a huge role in my whole story, especially with my disability.” She noted the connection between the Christian mission at PCSU and the opportunity to care for people with a disability. Another participant furthered this theme by saying, “Through Christianity we are all one family and should not be divided.” Each participant has had a unique experience relating to Christianity at PCSU, but overall, each experience led the participants to the belief that Christianity is a major part of the imperative to implement DEI initiatives. For PCSU, whose mission is to integrate faith and learning, the university must prioritize the practical applications that demonstrate the adherence to their Christian mission as it relates to caring for students with hearing disabilities.

### **Theme 3: SCDS and Diversity, Equity, and Inclusion**

An important observation to note is the Student Counseling and Disability Services Center’s insensitivity and unawareness of current preferences of D/HH students regarding language and terminology of hearing disability. In the process of acquiring contextual information as well as finding potential participants, the researcher found the Disability Services Director to provide information inconsistent with audiologists, news articles, and recent headlines. For example, the Director said that the faculty in SCDS always use the term “hearing impaired” because it is a blanket term to encompass all students that are considered deaf or hard-of-hearing. After additional conversations and further research about the terminology, the researcher learned that “hearing impairment” is considered outdated and potentially offensive. The participants supported this idea by saying that PCSU could benefit D/HH students by increasing overall awareness of hearing disability as well as gaining a better understanding of the context, terminology, and types of hearing disabilities that exist on campus and in the community.

Another area of SCDS that was repeatedly mentioned was the treatment of students who have disabilities and need help from the institution. According to one, SCDS made him feel “diminished,” and another had a “really hard time” with the people who were supposed to be helping her, and she told the researcher the faculty at the center made her

feel like they thought she was “making something up.” Each participant with whom the researcher had a conversation felt negatively about the staff or the processes of the SCDS simply because of how they felt they had been treated when they had to use the SCDS to receive accommodations for their disability.

The analysis of the lived experiences of D/HH students at PCSU revealed an overall distaste of the Student Counseling and Disability Services at PCSU. The participants described the people working in the center as “apathetic” and “disbelieving.” One participant said that she had been in contact with SCDS twice in her three years at PCSU. She avoided interactions with the center due to the uncomfortable atmosphere and unorganized processes. She did go through the standard process to receive accommodations but found that professors did not always respect those accommodations.

### **Research Question 1: How does a hearing disability affect the college-going experiences of D/HH students?**

The first research question gave the participants the opportunity to share their individual stories in the context of their hearing disability. The participants described how they have navigated hearing disability, learning to “live beyond” their disabilities. Even though hearing disability became normalized in the lives of the participants, they still faced new challenges when they moved from the lives they had always known to a university for higher education.

One participant described having hearing disability as a “lifestyle” rather than an “experience,” and coming to PCSU opened new opportunities to grow as well as introduced new obstacles to overcome. Another furthered this point by explaining that her anxieties entering university were not the same as her friends. For example, her friends were worried about the color of their headboards and pillows, but she was worried about getting into a room with a flashing smoke detector. This subtle difference is representative of the unique college-going experiences of students with hearing disabilities. Another explained the ways in which her hearing disability affects her college-going experience in the classroom. She told the researcher that she asks professors to wear a microphone during class that transmits their voices to her hearing devices. In addition, she tries to sit near the front of the classroom and often relies on her classmates to help her with notes if she misses part of a lecture.

D/HH students encounter challenges about which other students never know, and listening to the voices of the participants allowed the researcher to learn about some of these challenges. The effects of a hearing disability are intertwined in the administrative processes required to attend PCSU in social, physical, emotional, and academic aspects of life. Each participant detailed their own experiences navigating the classroom, citing examples such as sitting near the front of the room or requesting recorded lectures or lecture notes. The participants explained that social experiences can be overwhelming or stressful if the general noise level is high, and the person speaking to them is difficult to hear. As a result, D/HH students must be aware of social factors, and these factors impact the decisions they make about which college events to attend and which to avoid.

### **Research Question 2: How has PCSU encouraged or hindered the academic and social development of D/HH students?**

Each participant referenced resources on the campus of PCSU that have encouraged or hindered their academic and social development. The resource to which the participants most frequently referred is the Student Counseling and Disability Services. Three of the four participants receive academic accommodations based on their disability, and to receive these accommodations, the students were required to meet with the SCDS, complete forms, and notify teachers of any accommodations. The processes that students with disabilities must complete for the SCDS can be complex and time-consuming, but the participants appreciate certain accommodations they receive based on their disability. An important hindrance to note is the experiences that the participants have had with professors. Two participants cited negative experiences with the attitudes of professors during their time at PCSU. One teacher was negligent to accommodations and did not allow a participant to move to a seat close enough to the front of the room. Another professor told other students about a participant’s disability without her permission and made light of her academic accommodations.

Other campus resources that have been beneficial for participants of this study are the Office of Student Engagement and the Office of Residential Life. One participant referenced the Office of Student Engagement as a resource that strongly encouraged his social development. He said that the office “helped to work around” his disability in planning and inviting him to social events. In addition, the faculty in the Office of Student Engagement always “made him feel welcome” to be involved and create community. Another participant referred to the Office of Residential Life as a beneficial resource. She said that the process of receiving housing accommodations was stressful, but the Office of Residential Life was able to help her secure a room with its own bathroom as well as a flashing fire alarm.

PCSU also encourages social development of D/HH students through opportunities for campus involvement. PCSU has a variety of academic clubs, social organizations, and leadership opportunities. For example, three participants are members of different social groups on campus, and they are able to find community through these organizations. An important aspect of PCSU to note is the prevalence of Christian groups on campus. PCSU has Fellowship of Christian Athletes, Baptist Student Union, Reformed University Fellowship, and many other Bible study groups on campus. These groups are avenues for PCSU to encourage students to develop socially as well as grow their Christian faith, and PCSU is able to further its Christian mission through these faith-based groups.

### **Research Question 3: In what areas (if any) do D/HH students at PCSU feel that PCSU could implement DEI initiatives to benefit D/HH students?**

Each participant gave specific areas in which they believed PCSU could improve resources or develop initiatives that would benefit D/HH students. Listening was the most frequently mentioned idea from the participants. One participant expressed the value of conversations she has had in which she felt as though people were listening to her, not to fix her situation or give advice, but simply to listen. Listening fosters understanding, which directly affects another area where DEI initiatives could benefit D/HH students. Increasing “overall awareness” as well as enhancing understanding of “terminology, context, and types” relating to hearing disability would allow D/HH to feel understood and valued by their peers and professors.

Another participant said that one way PCSU can help D/HH students in their academic and social development is creating “community groups of people with similar disabilities” or similar experiences. She described the process of coming to a university and seeking community, specifically looking for other students who had stories that are analogous to hers. Establishing groups that will connect D/HH students will promote relationships between students who can directly relate to the stories of the people in the group. In addition, these groups will serve as safe spaces for D/HH students to be transparent and open about their experiences without fear of being judged or misunderstood.

The last area the participants mentioned that certain initiatives would increase diversity, equity, and inclusion for D/HH students is in the enhancement of on-campus resources, specifically the Student Counseling and Disability Services. The participants suggested areas in which the SCDS could improve. For example, one participant said that a noise machine was running while he was trying to meet with a counselor in the SCDS. The noise machine was distracting and created difficulty to hear. Another added that communication was slow, and the processes were unorganized, pushing her away from wanting to be in communication with the SCDS. The participants felt that improving the SCDS would benefit D/HH students by giving them a resource on campus designed to create equal opportunity, to encourage academic success, and to be a place where they could seek help.

## **DISCUSSION**

The conversations between the participants and the researcher highlighted the voices of students with hearing disabilities at PCSU, and the researcher was able to better understand the experiences of D/HH students at PCSU. The process of phenomenological inquiry led the researcher to uncover details about the stories of the participants, and from their lived experiences, the researcher analyzed repeated themes and addressed the questions of this study.

The voices of D/HH students at PCSU were the central part of this study. The participants provided personal accounts of how their experiences at PCSU affected their academic and social development as it relates to their hearing disability. From their stories, the researcher was able to explore areas of potential weakness that could be strengthened using DEI initiatives to support D/HH students, and the participants gave their own ideas of areas where they believed PCSU could improve. The participants voiced improvements such as creating community groups, or safe spaces, for students with disabilities. Also, PCSU could benefit from providing educational opportunities to spread awareness of different disabilities to foster understanding of the college-going experiences of students with disabilities. This process showed that PCSU does have an opportunity to increase diversity, equity, and inclusion of D/HH students, and according to Lewin’s Theory of Planned Change, PCSU is moving into the unfreezing stage of the process.

The university recognizes that change is necessary, and leaders have been working to introduce initiatives designed to promote this change. For example, the Office of Student Success is a relatively new office for which the purpose is to provide students with resources to find a job during or after college.

### ***Implications***

The implications of this study suggest that PCSU could benefit from providing opportunities to D/HH to educate them on their rights under the Americans with Disabilities Act of 1990. Further, PCSU should offer D/HH students the



resources established on campus designed as DEI initiatives, specifically for students with hearing disabilities. Another implication suggests that the D/HH student population at PCSU is underrepresented; therefore, PCSU has the potential to recruit D/HH students to increase inclusion of D/HH students at PCSU as well as diversify the demographics of the student population. PCSU should seek ways to increase the representation of D/HH students. PCSU must be positioned through curriculum, framework, and resources to be accessible for all students, regardless of disability, background, race, or gender. For example, the D/HH students must have access to living arrangements that use a flashing fire alarm and individual bathroom, to allow for better safety. PCSU may increase the diversity of the student population by adjusting its position to be more accessible, therefore providing the opportunity of institutional power to a more diverse student population.

### **Limitations to the Study and Future Research**

This study is limited based on the sample size of the D/HH student population. Gaining access to the sample size required using the SCDS as well as snowball sampling. Also, the findings of this study are not generalizable and should not be used to make assumptions about other universities. However, the study could be replicated at another pervasively sectarian university or a secular university for comparison of resources and experiences for further study of the college-going experiences of students with hearing disabilities. In addition, this study does not make implications about the college-going experiences of students with disabilities other than those with a hearing disability. Future research could be done by looking through the lens of a different disability to see if the results of the study would be consistent or reveal new truths about the college-going experiences of students with hearing disabilities and other disabilities.

### **Recommendations for Change**

PCSU should be looking to increase overall representation of D/HH students in the overall student population. Also, PCSU should establish a regular avenue for D/HH students to provide feedback about the status of the accommodations receive, the resources on campus designed to help, and their experiences at PCSU relating to their hearing disability. SCDS should be a safe space for D/HH to voice their experiences. Furthermore, the communication pathways should be clear and concise for D/HH students, facilitating and simplifying the administrative processes required to receive necessary accommodations. Also, the SCDS should be a source that provides connection for all students with disabilities. The connections could be with other students with similar disabilities, to potential mentors, or to other campus resources. Having a source that helps with connection creates community and allows D/HH to feel understood.

The university also should take steps toward educational opportunities for the students and faculty at PCSU to spread awareness and create a better understanding of students with hearing disabilities. The opportunities could be in the form of an orientation or a presentation by the SCDS. Increasing overall awareness will help students and faculty at PCSU become more sensitive to the unknown challenges that D/HH students face in higher education. Specifically, PCSU, in carrying out their Christian mission, must instill in the faculty the desire to care for all students. The faculty are largely responsible for ensuring that the mission of PCSU is” integrated in the classroom, and PCSU should educate its faculty about the ways to be accommodating and sensitive to their students with various disabilities, specifically those who are deaf or hard-of-hearing.

The administration of PCSU should continue to look for ways to implement initiatives designed to diversify the campus, foster representation of minority groups, and include underrepresented groups in the operations of the campus. To develop initiatives, PCSU should create a task force composed of faculty members, professors, and students who represent a variety of departments and backgrounds. The purpose of this task force would be to identify areas of weakness related to DEI and implement initiatives to mitigate the weakness. The members of the task force could also work to create awareness of the context and types of disabilities throughout PCSU, increasing understanding and allowing D/HH students to feel supported by their peers and professors.

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# **Beyond the Classroom: Exploring The Role of Motivations and Participation in Clubs in Enhancing Student's Intellectual Growth, Social Support, and Well-Being**

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## **ABSTRACT**

Using data from a private midsized university in New England, this paper explored the relationships between student participation in clubs—measured by the number of clubs joined, the frequency of participation in clubs, motivations for involvement—and the desired outcomes of intellectual growth, social support, and well-being. This study used a quantitative approach and employed statistical techniques such as Bivariate Correlation and Ordinary Least Squares Multiple Regression Analysis to examine the relationships between club participation and student outcomes. The findings revealed that students, on average, participate frequently in clubs, and frequent participation is positively associated with intellectual growth and well-being, and the strength of the association is moderate. Students who are motivated to gain experience are more likely to participate in multiple clubs. The motivation to join clubs for gaining experience is significantly associated with intellectual growth. We conclude that when students are driven by a desire to gain practical experiences, club participation becomes a means to enhance their intellectual development, and to achieve new skills, knowledge, and perspectives. Understanding these relationships can help institutions and students alike to optimize their involvement in clubs.

Keywords: Student clubs, Motivations for participation, Frequency of participation, Intellectual growth, Social support, Well-being

## **INTRODUCTION**

Student retention in higher education institutions is a critical issue that has garnered significant attention in recent years. Ensuring that students graduate and become productive members of the workforce matters more than ever (Trowler & Trowler, 2010). Prior academic studies have shown a positive correlation between retention rates and student engagement (Astin, 1984, 1993). Students actively engaged in campus life tend to exhibit higher levels of academic achievement, as evidenced by improved GPAs, increased sense of belongingness, and are more likely to persist and graduate (Pascarella & Terenzini, 1991; Astin, 1993, Kuh, 2003, Buckley and Lee, 2021; King et al, 2021). One crucial facet of student engagement is participation in clubs. Prior studies have found that participation in clubs and organizations are associated with a multitude of positive outcomes for students such as psychosocial development, skill acquisition, overall well-being, perceived academic satisfaction among others (Pascarella & Terenzini, 1991; Kilgo et al, 2016; Webber et al, 2013; Foubert and Urbanski, 2006; Kuh, 2003; Raposa et al, 2021; Wittrup et al, 2021). Rebeiro et al (2024) found that participation in clubs and extracurricular activities not only improve grades but also enhance critical skills valued in the labor market, making them essential for bridging academic and professional transitions. While the positive outcomes of club participation are widely acknowledged, a more nuanced understanding of the extent to which different aspects of club participation influences outcomes are necessary.

This study focuses on examining the differential impact of the quantity, and quality of student participation in clubs on outcomes such as intellectual growth, social support, and well-being. By investigating the relationship between the number of clubs joined, frequency of participation in student clubs, and motivations for joining clubs with desired outcomes such as intellectual growth, social support, and well-being, this research aims to contribute to a deeper understanding of the mechanisms through which club participation shapes the college experience. Controlling for socio demographic variables such as gender, college, and year in school allows for a more precise examination of the relationships between the independent and dependent variables. The research questions guiding this study are the following: 1) to what extent does the number of student clubs joined influence students' intellectual growth, social support, and well-being; 2) how does the frequency of participation in student clubs relate to students' intellectual growth, social support, and well-being?; 3) do the motivations for joining student clubs (social, to gain experience, to

pursue interests) differentially predict students' intellectual growth, social support, and well-being?. By answering these questions, this study seeks to shed light on the complex interplay between student participation in clubs and the resulting benefits.

This study contributes to the existing body of research on involvement in student clubs in five ways: First, it provides a nuanced understanding of the extent to which various aspects of student participation in clubs are related to outcomes. Specifically, by focusing on specific aspects such as number of clubs joined, frequency of participation in clubs, and motivations for joining clubs, this research goes beyond broad generalizations about student involvement. Existing literature primarily focuses on the positive outcomes of student involvement without delving deeply into the diverse reasons why students join clubs or how these motivations shape their experiences. A more granular examination of student motivations is crucial for developing targeted interventions to enhance the overall college experience. Second, few studies have quantitatively analyzed the specifics of club participation such as number of clubs joined, and frequency of club participation, along with motivational factors driving club participation in relation to multiple outcomes (intellectual growth, social support, and well-being) within a single framework. As a result, this study helps bridge that gap in the literature by including number of clubs joined, and frequency of club participation, along with motivational factors driving club participation in relation to multiple outcomes within a single framework. Third, this study disentangles outcomes i.e., this study differentiates between three key outcomes—intellectual growth, social support, and well-being—allowing for a more precise understanding of how club participation impacts different aspects of student life. Fourth, by controlling for gender, college, and year in school, this research enhances the causal inferences that can be drawn from the findings. Finally, research on co-curricular participation is largely concentrated in larger or public institutions, leaving a gap in understanding how these dynamics manifest in private, mid-sized universities. By addressing these gaps in the literature, this study aims to advance the understanding of how student club participation shapes student outcomes.

In the following sections, we elaborate on prior literature and theoretical frameworks mainly student involvement theory and self-determination theory to develop our hypotheses. Then, using survey data collected from a mid-sized private university in New England, we present our findings. We then employ quantitative methodologies (specifics of the methodologies discussed in the methods section) to test our hypotheses using survey data on student participation in clubs collected during April and May 2024. We conclude by reporting our findings and discussing the theoretical and practical implications of our research on the relationship between quantity, and quality of student involvement in clubs and resultant outcomes such as intellectual growth, social support, and well-being.

## LITERATURE REVIEW AND HYPOTHESES

According to Astin's student involvement theory (SIT), involvement has been defined as the quantity and quality of physical and psychological energy that students invest in their college experience (Astin, 1993). Specifically, students' participation through observable behaviors, and through aspects such as commitment and motivation, together comprise of involvement. So, involvement is measured in the academic literature both quantitatively (number of clubs attended, frequency of participation, number of hours devoted to clubs and extracurricular activities in a week), and qualitatively (motivation, role in participation, i.e., member vs. leader, commitment). Astin (1993) posits that student time is a resource and the degree of personal growth a student accomplishes in an activity is directly related to the quality and quantity of time, effort, and motivation towards that activity. Thus, a greater amount of student involvement results in a greater gain in learning and personal development. Finally, personal growth and development occur when students are involved in opportunities that provide stimulation, challenge, and exposure to diversity. In other words, the more involved students are, the more likely they are to benefit intellectually and personally. A number of scholars have asserted that student clubs, organizations, and extracurricular programs should be viewed as essential components to overall education since they provide such strong benefits.

Abrahamowicz (1988) compared undergraduate students who were members of student organizations, and who were not, and found that members had significantly more positive perceptions of their relationships with other students, administrators, and faculty; of their learning and development in interpersonal areas; and of their feelings about college in general, compared to non-members. Williams and Winston (1985) surveyed 168 college students to examine how work and participation in student organizations contribute to student's personal development. Results showed students who participated in organizations were more developed in terms of educational, career, and lifestyle plans than other students. Further, students who were involved were more aware of resources and learning opportunities to achieve their career goals. However, Montelongo (2002) in his literature review on student involvement cited Anaya (1996) who reported that increase in the number of organizations and increase in the number of hours spent in student

organizations has a negative association with verbal and quantitative learning. Carruthers et al (2010) found that clubs foster a sense of belonging, improved leadership abilities, and increased self-confidence among participants. Christison (2013) highlights the benefits of extracurricular participation, particularly in promoting soft skills like communication and teamwork. Buckley and Lee (2021) indicate that extracurricular involvement enhances satisfaction and retention by offering a more holistic educational environment. But, overall, participation in student clubs and organizations seems to be an effective means to acquire personal resources such as interpersonal, and intellectual skills, that encourage the realization of aspirations.

While the benefits of college student involvement are well-documented, the specific impact of the *quantity* of involvement as measured by the number of clubs joined on outcomes remains an area of scholarly interest. While some studies suggest excessive participation in clubs and organizations as measured by number of clubs can lead to academic burnout, decreased verbal learning, and decreased well-being (Anaya, 1996; Fredricks & Eccles, 2005), most prior studies have found a positive association between number of club involvements and desired outcomes. Based on data from Wabash National Study of Liberal Arts Education (WNS), with a total of 49 institutions that varied by selectivity, size, control, type, and geographic location within the United States, Kilgo et al (2016) found number of student club involvements as a positive predictor of students' psychological well-being. However, Kilgo et al (2016) were unable to identify if there is a threshold at which the positive effects of student organization membership taper off or even decline based upon the number of clubs or organizations.

Foreman and Retallick (2016) conducted a survey at a large public university in the Midwest via online questionnaires. They found that the higher the number of clubs students are involved in, the greater the perceived sense of responsibility and empathy towards the university. By joining multiple clubs, students may be exposed to diverse perspectives, challenges, and opportunities for critical thinking. Opportunities for critical thinking enhances academic success, and intellectual growth (Webber, Krylow, & Zhang, 2013; Gellin, 2003). Furthermore, a study by Tieu et al. (2010) found that students involved in a variety of extracurricular activities reported higher levels of critical thinking and intellectual self-esteem, suggesting that diverse social interactions and experiences in different clubs stimulate cognitive growth. These findings align with the social cognitive theory (Bandura & Cervone, 1986), which suggests that learning is enhanced in environments where individuals are exposed to varied experiences and perspectives, thereby fostering intellectual growth. Kanar and Bouckennooghe (2021) found that students who reported being involved in a large number of extracurricular activities perceived a greater level of confidence in getting future job offers.

Participation in multiple student clubs increases exposure to diverse social networks, thereby broadening the scope of social support available to students. Research by Steinhardt and Dolbier (2008) indicates that active involvement in campus organizations is linked to higher levels of perceived social support, as these environments foster peer connections and a sense of belonging. Students actively engaged in multiple campus activities tend to report higher levels of life satisfaction, positive emotions, and overall psychological well-being (Kuh, 2003). Webber et al (2013) implemented the National Survey of Student Engagement (NSSE) survey in a research-intensive US university in the Mid-Atlantic region. They found that involvement in numerous activities in college contribute not only to a higher cumulative GPA but also to perceived satisfaction with one's entire college experience. All of these empirical findings suggest that participating in a variety of extracurricular activities can expose students to diverse perspectives, fostering personal growth and resilience, enhancing their intellectual growth, social support, and well-being. Therefore, we posit:

***H1: Students who participate in a higher number of clubs will report significantly greater levels of intellectual growth compared to those who participate in fewer clubs.***

***H2: Students who participate in a higher number of clubs will report significantly greater levels of social support compared to those who participate in fewer clubs.***

***H3: Students who participate in a higher number of clubs will report significantly greater levels of well-being compared to those who participate in fewer clubs.***

The frequency of participation in student clubs and organizations, hours spent per week in student clubs and organizations, and overall time commitment to extracurricular activities have emerged as crucial factors influencing desired outcomes among college students. Students who dedicate substantial time to clubs, organizations, and extracurricular activities often develop critical thinking, problem-solving, and leadership skills (Kuh, 2003). Frequent

participation in academic clubs can foster intellectual curiosity. Hours spent per week in student organizations is found to be positively associated with higher intellectual skills such as improvement in public speaking (Astin 1991). Hours spent per week in student organizations is also associated with positive feelings and attitude about the college experience, greater levels of enthusiasm about college and overall satisfaction with college (Astin, 1993; Abrahamowicz, 1988). Huang and Chang (2004) found that students who participated frequently in clubs and organizations reported a higher level of growth in cognitive, communication, and interpersonal skills, compared to students who participated less often. Foreman and Retallick (2016) conducted a survey at a large public university in the Midwest via online questionnaires. They found students who spent more time, in terms of number of hours per week in clubs and organizations scored higher on community values, and leadership scale. Furthermore, time spent on extracurricular activities is linked to increased social support and well-being. Regular participation in clubs and organizations fosters a sense of belonging, friendship, and social connectedness (Astin, 1993). These relationships provide emotional support, reduce feelings of loneliness, and contribute to overall life satisfaction.

However, the relationship between student involvement (especially time spent in campus activities) and its outcomes is not always positive. Involvement may lead to burnout and negatively affect academic performance if students overcommit to extracurricular (Fares et al, 2019). Nonetheless, moderate to high levels of engagement are generally associated with positive developmental outcomes. Overall, Astin's theory and subsequent research highlight the importance of encouraging students to engage meaningfully and frequently in campus life, as it fosters academic success, personal development, and social integration. Therefore, we posit:

***H4: Students who participate more frequently in clubs will report significantly higher levels of intellectual growth compared to those with lower participation frequency.***

***H5: Students who participate more frequently in clubs will report significantly higher levels of social support compared to those with lower participation frequency.***

***H6: Students who participate more frequently in clubs will report significantly higher levels of well-being compared to those with lower participation frequency.***

The notion that college students report varied motivations for joining clubs, organizations, and extracurricular activities, which in turn affects their personal outcomes, is supported by academic literature. Based on 46 structured student interviews at an urban UK university, Chapman et al (2023) examined student motivations to participate in extracurricular activities, and reported different types of motivation, ranging from extrinsic (e.g., to gain experience, rewards), to intrinsic (e.g., to pursue interests and hobbies), and social (e.g., to meet people, make friends). Dang and Nguyen (2021) found that perceived benefits, institutional support, and peer influence significantly impact club participation decisions.

Self-determination theory (SDT) developed by Deci and Ryan (1985) is a theoretical framework for understanding the association between motivation and personal outcomes, through the fulfillment of basic psychological needs of autonomy, competence, and relatedness. In the context of student club participation, SDT provides a lens through which different types of motivation (extrinsic, intrinsic, and social) influence desired personal outcomes. Students motivated to join clubs by an extrinsic desire to gain experience are likely to report higher levels of intellectual growth and well-being, due to fulfillment of their psychological needs of autonomy and competence. Clubs offer opportunities for skill development, empower students for their future careers, and may expose them to challenges, and continuous feedback. Opportunities for skill development, challenges, and feedback contribute to a sense of competence, and autonomy (Deci and Ryan, 2012).

When students join clubs out of intrinsic motivation, such as pursuing a personal passion or interest, they are more likely to experience a broad range of benefits, including enhanced well-being, intellectual growth, and social support (Deci & Ryan, 2008). Intrinsic motivation is closely tied to the fulfillment of autonomy, as students feel that their participation is self-endorsed and aligned with their true interests (Deci et al, 2017). This sense of autonomy, coupled with the competence developed through active engagement in meaningful activities, contributes to higher levels of psychological well-being (Assante et al, 2023; Sheldon et al, 2004). Furthermore, the social connections formed through shared interests in intrinsically motivated activities can lead to stronger social support networks, as students are more likely to bond over genuine mutual interests (Ryan & Deci, 2000). Students motivated to join clubs to meet new people are likely to experience enjoyment, and fulfillment of their psychological needs of relatedness and social

connectedness due to their participation in clubs and thereby report an increased level of social support. According to scholars (Ryan & Deci, 2000; Kuh et al, 2006), social motivations are associated with positive outcomes, through the fulfillment of our psychological needs of relatedness (Deci and Ryan, 2000).

*P1: The type of motivation driving student club participation influences the outcomes derived from such participation.*

## DATA, MEASURES AND METHODS

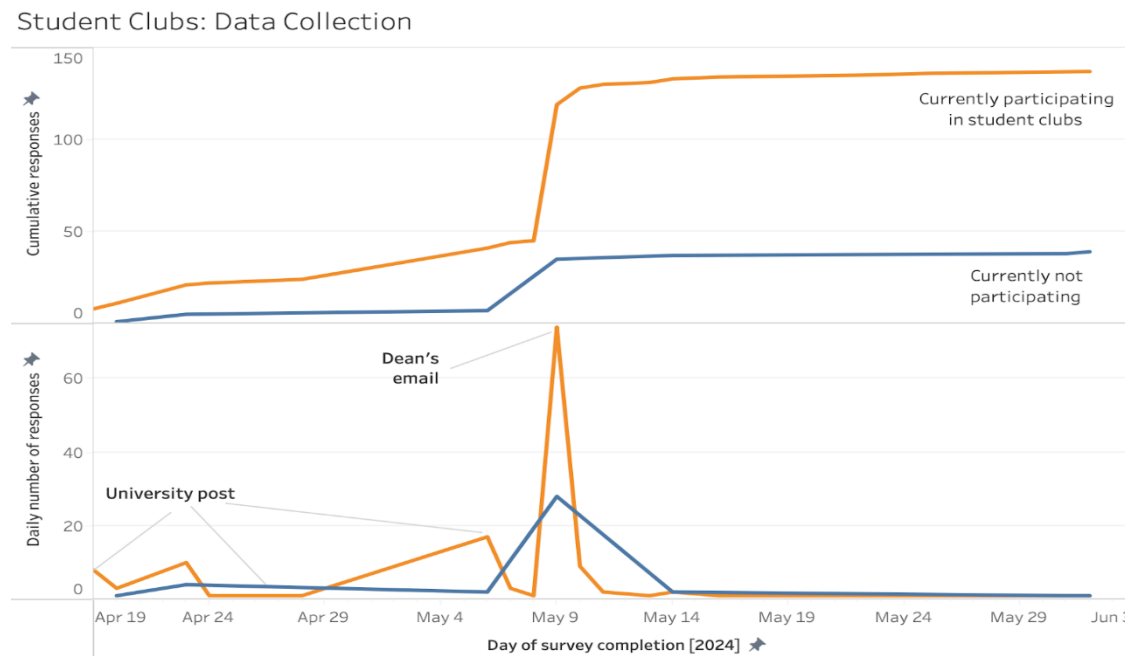
### DATA

To understand student participation in clubs, student motivation to join clubs, and outcomes because of student participation in clubs, a survey was emailed to students at a private mid-sized university in New England. The survey was launched in the third week of April 2024 and remained in the field till the first week of June 2024. The survey asked questions on whether students were part of any clubs, students interests or hobbies, number of clubs they participated in, frequency of participation in clubs, leadership positions, perceived outcomes, and gender, year in school, college, among others. The median time taken to complete the survey was 3 min. The survey was IRB approved and was implemented using Microsoft forms.

The survey was publicized to the students in two ways: (1) by posting an announcement to the University-wide email post on three dates, and (2) through an email from the College of Business Dean directly to all undergraduate students. The survey saw a significant boost in participation following the Dean's email announcement. The email from the Dean acted as a catalyst, encouraging students to respond to the survey and leading to a noticeable spike in responses. This highlights the effectiveness of direct communication from key administrative figures in driving student involvement (see Fig 1.).

We also mentioned the survey in our classes and encouraged our colleagues in the Department to mention it to their students. Over this time period, 176 students responded to the survey. Of these students, 137 (77.8%) reported being part of clubs, while 39 (22.2%) reported that they were not part of any student clubs yet. For this paper, we included students who are members of clubs (N=137).

**Figure 1: Student Responses on the Survey**



## MEASURES

**Intellectual growth** was measured by four items (e.g., “Being involved in student clubs enhances my critical thinking skills and analytical abilities”) on a 5-point scale (1=strongly disagree, 5=strongly agree). Higher scores reflect perceptions of greater intellectual growth as a result of participation in student clubs. Cronbach’s alpha for this scale was .0.907. The average of item responses indicates the overall level of intellectual growth as a result of participation in student clubs.

**Social support** was measured by two items (e.g., “The club members are supportive of each other’s personal and academic endeavors”) on a 5-point scale (1=strongly disagree, 5=strongly agree). Higher scores reflect perceptions of greater social support as a result of participation in student clubs. Cronbach’s alpha for this scale was .0.892. The average of item responses indicates the overall level of social support as a result of participation in student clubs.

**Well-being** was measured by three survey items (e.g., “Participating in student clubs helps me maintain a healthy lifestyle”) on a 5-point scale (1=strongly disagree, 5=strongly agree). Higher scores reflect perceptions of greater health and well-being as a result of participation in student clubs. Cronbach’s alpha for this scale was 0.901. The average of item responses indicates the overall level of well-being as a result of participation in student clubs.

**The number of clubs** was measured by asking the students: how many clubs were they involved in? The responses ranged from 1 to 4 or more. **Frequency of participation** was measured by asking the students: How frequently do you actively participate in club meetings, events, or initiatives? The responses ranged from 1=rarely to never; to 5=always. **Motivations or reasons to join clubs** were measured by asking the students: what motivated you to get involved in clubs? a) to meet new people (1/0); to pursue interests or hobbies (1/0); to gain experience (1/0).

Students reported their year in school, where (1=first year, 2=sophomore, 3=junior, 4=senior). For analysis purposes, the year in school was recoded into four binary or dummy variables, first year (1/0), sophomore (1/0), junior (1/0), and senior (1/0). Additionally, we controlled for college and gender. For analysis purposes, the college was recoded as business (1/0).

## METHODS

Ordinary least squares (OLS) multiple linear regression was chosen in our study as it allows for hypothesis testing in scenarios where relationships between multiple predictors and an outcome need to be understood. For example, in this study, the hypotheses posit that “students’ intellectual growth, social support, and well-being improve with participation in clubs, and OLS regression can estimate the relative contributions of predictor variables (number of clubs, participation frequency in clubs, motivations to join clubs) while controlling for variables like gender, college, and year in school. Specifically, to test the hypothesis H4, that **students who participate more frequently in clubs report higher levels of intellectual growth compared to those with lower participation frequency, multiple linear regression** using the **ordinary least squares (OLS)** method can estimate the relative contribution of participation frequency on the outcome variable, intellectual growth, while accounting for the effects of control variables. The goal of OLS regression is to find the line that best predicts the dependent or outcome variable based on the independent or predictor variables by minimizing the sum of squared differences between the observed values and the predicted values. We also conducted Bivariate correlation analyses to measure the strength and direction of r relationships between independent variables or predictors and dependent variables or outcomes. In the context of our study, bivariate correlation (using the Pearson correlation coefficient) allows us to explore how different aspects of student participation in clubs (e.g., number of clubs joined, frequency of participation, motivations for involvement) are related to the desired outcomes of **intellectual growth, social support, and well-being.**

## DESCRIPTIVE FINDINGS

51.8% of the students in our sample are females, 45.3% are males, and 2.9% are non-binary (see Table 1). First year students comprise 27.7% of the sample, sophomores make up 22.6% of our sample, juniors and seniors comprise 27.7% and 21.9% respectively. Students from the college of Arts and Sciences make up 36.5% of our sample, followed by college of Business with 31.4% and college of Engineering with 26.3%. Table 2, and 3 show the frequencies of the independent variables, and dependent variables respectively.



One of the focusses of this study was to compare College of Business with other colleges. We found that while 16.3% of business students participate in four or more clubs, in other colleges, only 8.5% of students do so (see Fig. 2). Intellectual growth and well-being because of participation in clubs, on average, are slightly higher among college of business students compared to students in other colleges (see Fig. 3). Perhaps this could mean that College of Business students are more career-driven and more conscious of how much their “resume building” efforts as well as real benefits (intellectual growth and well-being) from participating in student clubs compared to students in other colleges.

**Table 1: Characteristics of the sample (N=137)**

<b>Characteristics</b>	<b>N</b>	<b>%</b>
<b>Gender</b>		
Female	71	51.8
Male	62	45.3
Non-binary	4	2.9
<b>Year in School</b>		
First year student	38	27.7
Sophomore	31	22.6
Junior	38	27.7
Senior	30	21.9
<b>College</b>		
Arts and Sciences	50	36.5
Business	43	31.4
Engineering	36	26.3
Law	1	0.7
Pharmacy and Health Sciences	4	2.9

Table 2 shows that most students reported that they were members of one club (44.5%). Most students participate in clubs often (29.9%), or always (48.9%). 76.6% of students responded that their motivation to join clubs is to pursue their interests and hobbies. 37.2% of students responded that their motivation to join clubs is to gain experience. 64.2% of students responded that their motivation to join clubs is to meet new people.

**Table 2: Frequencies of Independent variables**

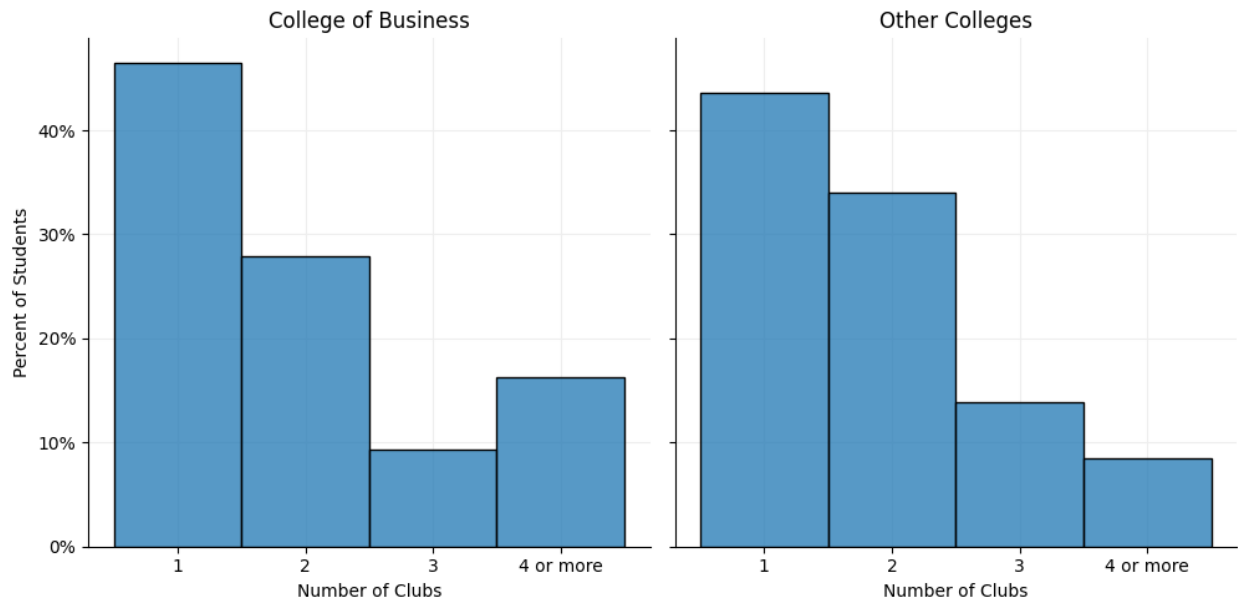
<b>Variables</b>	<b>N</b>	<b>%</b>
<b>Number of Clubs joined</b>		
1	61	44.5
2	44	32.1
3	17	12.4
4	15	10.9
<b>Participation Frequency</b>		
Rarely or never	5	3.6
Occasionally	13	9.5
Sometimes	11	8.0
Often	41	29.9
Always	67	48.9
<b>Motivation to join clubs: to pursue interests or hobbies</b>		
No	32	23.4
Yes	105	76.6
<b>Motivation to join clubs: to gain experience</b>		
No	86	62.8
Yes	51	37.2
<b>Motivation to join clubs: to meet new people</b>		
No	49	35.8
Yes	88	64.2

**Table 3: Frequencies of Dependent variables**

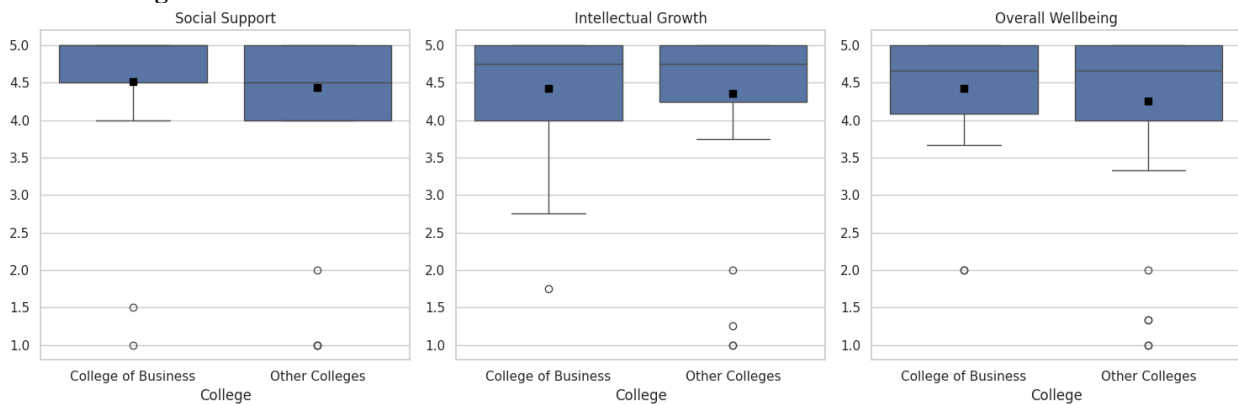
<b>Variables</b>	<b>N</b>	<b>%</b>
<b>Intellectual Growth</b>		
<b>Student club allows me to deepen my understanding of academic subjects outside of the classroom</b>		
Strongly disagree	4	3.2
Disagree	11	8.7
Neutral	34	27.0
Agree	37	29.4
Strongly Agree	40	31.7
<b>Student clubs enhance my critical thinking skills and analytical abilities.</b>		
Strongly disagree	3	2.3
Disagree	9	6.8
Neutral	22	16.5
Agree	45	33.8
Strongly Agree	54	40.6
<b>Student club provides me with opportunities to challenge myself and set personal goals for improvement</b>		
Strongly disagree	3	2.3
Disagree	4	3.1
Neutral	19	14.5
Agree	41	31.3
Strongly Agree	64	48.9

<b>Student club allows me to learn from others and improve my skills through collaboration and teamwork</b>		
Strongly disagree	3	2.3
Disagree	4	3.1
Neutral	9	6.9
Agree	39	29.8
Strongly Agree	76	58.0
<b>Social Support</b>		
<b>student club allows me to feel a sense of belonging and community on campus</b>		
Strongly disagree	5	3.8
Disagree	2	1.5
Neutral	17	12.8
Agree	37	27.8
Strongly Agree	72	54.1
<b>The club members are supportive of each other's personal and academic endeavors</b>		
Strongly disagree	4	3.1
Disagree	2	1.5
Neutral	12	9.2
Agree	48	36.6
Strongly Agree	65	49.6
<b>Well-being</b>		
<b>Student club helps me alleviate stress and worries by engaging in enjoyable and fulfilling activities</b>		
Strongly disagree	3	2.3
Disagree	12	9.0
Neutral	24	18.0
Agree	42	31.6
Strongly Agree	52	39.1
<b>Participating in student clubs helps me maintain a healthy lifestyle</b>		
Strongly disagree	4	3.1
Disagree	10	7.6
Neutral	30	22.9
Agree	39	29.8
Strongly Agree	48	36.6
<b>Club encourages me to engage in activities that improve my mental health</b>		
Strongly disagree	4	3.1
Disagree	5	3.8
Neutral	26	20.0
Agree	45	34.6
Strongly Agree	50	38.5

**Figure 2: Comparing College of Business with other colleges in terms of number of student clubs joined**



**Figure 3: Box plots comparing college of Business with other colleges on intellectual growth, social support, and well-being**



**BIVARIATE CORRELATION FINDINGS**

We performed bivariate correlation analyses between all independent variables as well as the three dependent variables. The Bivariate Correlation table also shows the means and SD of all the variables. The means show that students are members of two clubs, on average. Students participate often in club meetings, events, and initiative, on average. Specifically, frequency of participation is on a scale from 1 to 5, where 1 is rarely, and 5 is always; the mean participation frequency was found to be 4.11, corresponding to “participating often in club meetings”. 76.6% of students responded that their motivation to join clubs is to pursue their interests and hobbies. 37.2% of students responded that their motivation to join clubs is to gain experience. 64.2% of students responded that their motivation to join clubs is to meet new people. On average, students seem to agree that student clubs have helped enhance their intellectual growth, social support, and well-being. Specifically, the outcome or dependent variables is on a scale of 1

to 5, where 1 is strongly disagree and 5 is strongly agree, the mean on the outcome variables: intellectual growth, social support, and well-being, was found to be around 4, suggesting that on average, students seem to agree with the fact that participation in student clubs brought about intellectual growth, social support, and well-being.

Motivation to join clubs to gain experience is positively correlated with number of clubs joined ( $r=0.230$ ;  $p<0.05$ ), suggesting that students who are driven by a desire to gain experience are more likely to actively seek out and participate in multiple clubs. This correlation finding indicates that the pursuit of experiential learning is a significant factor influencing students' involvement in clubs. Students who are motivated about pursuing their interests and hobbies are more likely to actively seek out and participate in multiple clubs ( $r=0.230$ ;  $p<0.05$ ), indicating that personal interests and hobbies are a significant factor influencing students' involvement in clubs and organizations.

Motivation to join clubs to gain experience is positively correlated with intellectual growth ( $r=0.207$ ;  $p <0.05$ ), suggesting that students find participation in clubs meaningful, intellectually stimulating, and beneficial in terms of skill development, and thereby fulfills the need for competence. As a result, students who are motivated to join clubs to gain experience report a higher level of intellectual growth. Motivation to join clubs to meet new people is positively correlated with social support ( $r=0.211$ ;  $p<0.05$ ), suggesting that participation in clubs fulfills the need for relatedness and social connectedness. Motivation to join clubs to meet new people is positively correlated with well-being ( $r=0.210$ ;  $p<0.05$ ), suggesting that participation in clubs fulfills the need for relatedness, and social interaction with club members is enjoyable, resulting in reduced stress, and enhanced overall well-being. Frequency of participation in clubs is also positively correlated with well-being ( $r=0.174$ ;  $p<0.05$ ), suggesting that students who participate in clubs more often find participation in clubs enjoyable, fulfilling, and less stressful, and as result report a higher level of well-being, compared to students who participate less often. Being a sophomore is positively correlated with well-being ( $r=0.178$ ;  $p<0.05$ ), suggesting that sophomores report a higher level of well-being as a result of participation in student clubs compared to others. This finding means that not all students benefit equally from participating in student clubs. Lastly, Motivation to join clubs to pursue interests and hobbies is positively correlated with number of clubs joined ( $r=0.393$ ;  $p<0.05$ ), and with frequency of participation joined ( $r=0.210$ ;  $p<0.05$ ),

**Table 4: Bivariate Correlation**

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Female	0.52	0.50	1												
2 Business	0.32	0.47	-0.03	1											
3 First year	0.28	0.45	0.01	-.220*	1										
4 Sophomore	0.23	0.42	0.00	0.078	-.335**	1									
5 Junior	0.28	0.45	-0.06	0.04	-.384**	-.335**	1								
6 Number of clubs	1.90	1.00	0.03	0.029	0.08	-0.032	0.047	1							
7 Frequency of participation in clubs	4.11	1.13	0.12	-0.092	0.027	0.118	0.07	0.094	1						
8 Motivation to join clubs: pursuing interests or hobbies	0.77	0.43	0.06	-0.154	0.072	0.134	-0.005	.393**	.238**	1					
9 Motivation to join clubs: gaining experience	0.37	0.49	0.05	0.109	-.207*	0.053	0.13	.230**	-0.035	.211*	1				
10 Motivation to join clubs: meeting new people	0.64	0.48	0.04	-0.109	0.156	-0.033	0.054	0.091	0.127	.200*	0.039	1			
11 Intellectual growth	4.08	0.90	0.00	0.005	-0.091	0.11	0.091	0.094	0.174	0.031	.207*	0.158	1		
12 Social support	4.28	0.91	0.01	0.001	-0.057	0.073	0.115	0.022	0.156	0.057	0.145	.211*	.831**	1	
13 Well-being	3.95	0.96	0.03	-0.024	0.059	-.178*	0.07	0.055	.174*	0.164	0.133	.210*	.749**	.752**	1

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

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

## REGRESSION FINDINGS

### *Regression findings predicting intellectual growth*

Table 5 presents the effects of number of clubs, frequency of participation in clubs, motivation or reasons to join clubs along with gender, college, and year in school on intellectual growth, social support, and well-being. The effects of these factors on intellectual growth are significant (F statistic =1.887, p value < 0.05). Together, these variables explain 14.8% of the variation in intellectual growth. Frequency of participation is positively associated with intellectual growth. That is, students who report participating in clubs more frequently report a higher level of intellectual growth compared to those with lower participation frequency. This finding means that frequent meetings provide regular feedback and opportunities to learn, practice, and apply critical thinking, and problem-solving skills, enhancing student's beliefs in their intellectual abilities. Our findings align with Huang and Chang (2004) who found that students who participated frequently in clubs and organizations reported a higher level of growth in cognitive and communication skills, compared to students who participated less often.

Students who responded that their reason or motivation to join clubs is to gain experience, reported a higher level of intellectual growth compared to students who are motivated by other factors. When students join clubs with the motivation to gain experience, they are mostly seeking to enhance their skills, and knowledge, perhaps build their resume, and enhance their self-efficacy, and competence. As the needs for competence are met, because of club participation, students report a higher level of intellectual growth. This finding aligns with self-determination theory (SDT) which posits that fulfillment of psychosocial needs such as competence results in desired outcomes (Deci et al, 2017).

Students who responded that their reason or motivation to join clubs is to meet new people reported a higher level of intellectual growth compared to students who are motivated by other factors. This finding suggests that when students join clubs with the motivation to meet new people, they are seeking social connectedness, and relatedness. The social connections formed as a result of club participation perhaps expose the students to diverse and intellectually stimulating ideas, and challenges, resulting in higher levels of intellectual growth.

### ***Regression findings predicting social support***

The effects of number of clubs, frequency of participation in clubs, motivation or reasons to join clubs along with gender, college, and year in school on social support are significant (F statistic =1.687, p value < 0.1). Together, these variables explain 12.6% of the variation in social support. Students who responded that their motivation to join clubs is to gain experience, reported a higher level of social support compared to students who are motivated by other factors. Interestingly, when students join clubs with the motivation to gain experience, they are seeking enhancement in their skills, and competence. However, club participation provides opportunities for social networking and interactions, and they may form genuine social connections, resulting in enhanced social support.

Students who responded that their reason or motivation to join clubs is to meet new people reported a higher level of social support compared to students who are motivated by other factors. When students join clubs with the motivation to meet new people, they experience the fulfillment of their psychological needs of relatedness and social connectedness and thereby report an increased level of social support. Our findings support previous findings by (Deci and Ryan, 2000) who also found that social connections can buffer stress, and contribute to overall life satisfaction.

### ***Regression findings predicting well-being***

The effects of number of clubs, frequency of participation in clubs, motivation or reasons to join clubs along with gender, college, and year in school on well-being are significant (F statistic =2.285, p value < 0.05). Together, these variables explain 16.6% of the variation in well-being. First year students and sophomores report a greater level of well-being compared to seniors. This finding indicates that first year students and sophomores find clubs as a vital source of support and well-being, as compared to seniors. Perhaps as they are new to the college experience, they have a greater need for well-being and recognize clubs as a valuable outlet to enhance their overall personal development and well-being. Students who responded that their reason or motivation to join clubs is to gain experience, reported a higher level of well-being compared to students who are motivated by other factors. This finding means that through participation in clubs, students can not only gain competence, enhance their skills, but also build confidence through collaboration and teamwork, and a sense of well-being. Lastly, students who responded that their reason or motivation to join clubs is to meet new people, reported a higher level of well-being compared to students who are motivated by other factors, suggesting that as students join clubs, their interaction with other members fosters a sense of community and belongingness, perhaps reducing their stress, and enhancing their well-being.

## **CONCLUSION**

Using data from a private midsized university in New England, this paper explored the intricate relationships between student participation in clubs—measured by the number of clubs joined, the frequency of participation in clubs, motivations for involvement—and the desired outcomes of intellectual growth, social support, and well-being. Understanding these relationships can help institutions and students alike to optimize their involvement in clubs. While the *R*-squared values in the regression findings (14.8% for intellectual growth, 12.6% for social support, and 16.6% for well-being), reflect moderate explanatory power, they align with expectations for social and behavioral research, as noted by prior literature. For instance, Ozili (2023) argues that a low *R*-square of at least 0.1 (or 10 percent) is acceptable in social science research, if some of the explanatory variables are statistically significant.

**Table 5: Multiple Regression predicting intellectual growth, social support, and well-being as a result of participation in student clubs**

	Regression coefficients (unstandardized)		
	Intellectual growth	Social support	Well-being
(Constant)	3.263***	3.518***	2.862***
Female	-0.019	0.029	0.071
Business	-0.026	0.019	0.07
First year	-0.071	-0.009	0.425*
Sophomore	0.203	0.174	0.591**
Junior	0.073	0.17	0.336
Number of clubs joined	0.046	-0.035	-0.074
Frequency of participation in clubs	0.132**	0.102	0.089
Motivation to join clubs: pursuing interests or hobbies	-0.228	-0.085	0.191
Motivation to join clubs: gaining experience	0.448***	0.348**	0.299*
Motivation to join clubs: meeting new people	0.281*	0.41**	0.344**
R squared	0.148	0.126	0.166
Standard error	0.82609	0.8522	0.88734
F statistic	1.887**	1.687*	2.285**

Notes: N = 137; \*\*\* p < 0.01. \*\* p < 0.05. \* p < 0.1. Female is dummy coded with 1 as female; 0 as others  
 Business is dummy coded with 1 as Business; 0 as others  
 Senior is the reference

The number of clubs joined, the frequency of participation, and the underlying motivations for club involvement have distinct effects on intellectual growth, social support, and well-being. Our study revealed that students, on average, participate frequently in clubs, and frequent participation is associated with higher levels of intellectual growth and well-being. This finding highlights the importance of student clubs as spaces for intellectual exploration and growth. We can conclude that student clubs provide a valuable environment for students to acquire new skills, knowledge, and perspectives, and to develop their cognitive abilities. Similar findings Huang and Chang (2004) found that students who participated frequently in clubs and organizations reported a higher level of growth in cognitive, communication, and interpersonal skills, compared to students who participated less often. Business students participate more frequently in clubs compared to students in other colleges. The higher participation frequency for business students aligns with the growing emphasis on experiential learning and professional development in business schools. By advancing discussions on experiential learning in business education, this study makes a contribution to thought leadership.

Clubs are also significant contributors to overall well-being. Institutions should promote frequent participation in clubs and regularly measure the impact of clubs on student outcomes such as intellectual growth and well-being. Clearly, frequency of participation matters, while number of clubs does not, indicating that participation depth rather than breadth drives student outcomes. While this result may seem to contradict our hypotheses (H1, H2, and H3), it aligns with some existing research and highlights the complexity of student engagement in clubs and extracurricular activities. Perhaps there is a threshold effect in club participation. Matjasko et al. (2019) discussed the idea that while some participation is beneficial, excessive participation might lead to diminishing returns or even negative consequences. This could explain why simply increasing the number of clubs joined does not necessarily correlate with improved outcomes. Future research could explore whether there is an optimal level of involvement that maximizes benefits for students without overwhelming them or detracting from their academic pursuits.

Further, the benefits of participating in clubs, especially in terms of well-being, are most pronounced in the earlier years of college. This finding aligns with Foubert and Grainger (2006) who found that students experienced the greatest gains in psychosocial development from involvement in student organizations during their first two years of

college. While freshmen and sophomores find club participation a vital source of well-being, as compared to seniors, club participation does not seem to matter for their intellectual growth or social support. This finding underscores the complexity of the impact of club participation on students. Perhaps, incorporating qualitative methods in the future, as suggested by Carruthers et al. (2010), could provide richer insights into how students throughout their college years benefit from club participation.

Our study revealed that students who are motivated to gain experience are more likely to participate in multiple clubs. We can conclude that experience-based learning seems to be a significant factor influencing students' involvement in multiple clubs. Students increasingly recognize the value of practical experience in preparing for their future careers and perceive clubs as valuable means to gain a wide range of practical experiences. This is in line with previous findings by Webber et al (2013) that by joining multiple clubs, students may be exposed to a range of diverse perspectives, challenges, and opportunities. Further, students who are motivated to pursue personal interests and hobbies participate in multiple clubs and participate more frequently. Students recognize the need to pursue their personal interests and hobbies as crucial in shaping their overall college experience and perceive clubs as valuable environments to pursue their personal interests and hobbies.

The motivation to join clubs for gaining experience is significantly associated with intellectual growth. We can conclude that when students are driven by a desire to gain practical experiences, club participation becomes a means to enhance their intellectual development, and to achieve new skills, knowledge, and perspectives. Student's value experiential learning in clubs, where they can apply theoretical concepts to real world contexts, and expand their intellectual development. The motivation to join clubs for gaining experience not only enhances intellectual growth but also social support and improves well-being. Students who seek to gain experiences through club participation seem to engage more meaningfully with club activities, leading to not only intellectual growth but also a deeper sense of community, and greater overall well-being. These outcomes highlight the multifaceted benefits of joining clubs for experience-driven motives, as they address academic, social, and personal development. Our findings also acknowledge that students have multiple, and interrelated motivations for participating in clubs, and the interplay of these motivations can complicate the interpretation of their differential impacts. To address this issue in future research, we plan to employ sophisticated analytical techniques, such as factor analysis or structural equation modeling, to better differentiate between distinct motivational constructs.

## **IMPLICATIONS FOR SOCIETY AND HIGHER EDUCATION INSTITUTIONS**

This study revealed that the benefits of participating in clubs, especially in terms of well-being, is most pronounced in the earlier years of college. First year students and sophomores find club participation a vital source of support and well-being, as compared to seniors. Higher education institutions should consider prioritizing club involvement initiatives aimed at first- and second-year students to help them build strong social networks and enhance their overall well-being early on. From a theoretical perspective, this finding contributes to understanding how students' needs and motivations evolve throughout their college journey. Freshmen and sophomores may view clubs as important for their social integration and stress relief, while seniors may see them as less relevant to their immediate priorities.

This study highlights the importance of student clubs as spaces for intellectual growth and well-being. Specifically, students perceive clubs as providing a valuable environment for their intellectual growth and well-being. Further, this study revealed that students who are motivated to gain experience are more likely to participate in multiple clubs and report a higher level of intellectual growth. Students perceive clubs to gain practical experience. Given these findings, higher education institutions should focus on providing experience-based learning opportunities through student clubs and organizations. This may include internships, research projects, and community service initiatives. Perhaps, institutions may offer guidance to help students identify clubs that align with their career goals and provide opportunities for experiential learning. While higher education institutions may face financial and logistical challenges in implementing internships, research and community service projects, partnerships with local businesses, and nonprofits may help mitigate these resource challenges. Further, encouraging alumni or donors to support funding for experiential learning initiatives may also mitigate resource challenges.

The positive outcomes of club participation such as intellectual growth and wellbeing have implications for society and higher education more broadly. Skills and experiences gained from club participation can lead to a successful transition from higher education to the workplace (Christison, 2013). Students who participate actively in clubs are likely to develop civic responsibility and more likely to be more involved in community service. As a result of club



participation, well-rounded and intelligent students can contribute effectively to their chosen professional fields and their communities (Carruthers et al, 2010; Christison, 2013).

## LIMITATIONS AND FUTURE DIRECTIONS

The data for this survey comes from a survey that was emailed to students at a private mid-sized university in New England. This limits the generalizability of our findings to public institutions, community colleges, or universities in other parts of the country. To improve the generalizability of our findings, we plan to expand our research to different types of institutions, such as community colleges and large public universities in the future. Another limitation of this study is the cross-sectional nature of survey data, and as a result, we cannot establish causality. Additionally, the scope of our survey was intentionally limited to a concise set of variables on club participation to ensure higher response rates, to reduce respondent burden, and to maintain respondent anonymity. Consequently, we were unable to include broader contextual factors, such as personality traits, academic workload, GPA, external support systems, socioeconomic status, self-efficacy, administrative support, and overall campus culture, which might indeed play a critical role in explaining the variance in outcomes. We plan to include these contextual factors in future research, as these inclusions would allow for a more robust understanding of the dynamics between club participation and student outcomes. We also plan to include measures of involvement intensity (leadership roles vs. general roles) as this would allow for clearer insights into the positive outcomes of club participation. Specifically, by analyzing the specific leadership responsibilities and time commitments associated with different roles within clubs, we can gain a more nuanced understanding of how these factors contribute to intellectual growth, social support, and well-being. Further, as our study relies on self-reported survey data, it is possible that students may have overestimated or underestimated their participation in clubs, and the resulting benefits of clubs. While our study uses survey data, and is based on quantitative methodologies, we plan to include qualitative research methods such as in-depth interviews or focus groups on the future as these can offer valuable insights into students' motivations and priorities when joining clubs.

Despite the noted limitations, our correlation and regression findings provide meaningful insights into the specific role of club participation, including frequency and motivation, in shaping intellectual growth, social support, and well-being. Clearly, frequency of participation matters for intellectual growth, while number of clubs joined does not matter for any outcomes. A more nuanced investigation is needed in the future to carefully explore the relationship between the number of clubs joined and student outcomes, and whether there is a threshold effect. While some participation is beneficial for students, joining a large number of clubs may not be beneficial for students (Matiasko et al, 2019). We want to expand this research in the future to determine the optimal level of club participation that maximizes benefits for students. Further, previous research has focused on the increasing role of technology and social media in higher education. For example, technology has been found to promote inclusivity and engagement, especially for students with diverse or non-traditional backgrounds (Hehir et al, 2021). Technologies such as virtual meeting platforms expand access and engagement opportunities, making club participation and extracurricular activities more inclusive and adaptable (Haleem et al, 2022; McNicholl et al 2021). Social media platforms provide a means for promoting and organizing extracurricular activities, improving accessibility for students who balance education with other responsibilities (Davis et al, 2015). In the future, we plan to examine the effects of technology on student involvement, as well as explore the perspectives of students from diverse and non-traditional backgrounds.

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# Teaching Degrees of Freedom in Beginning Statistics

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## ABSTRACT

A mysterious and vague topic in beginning statistics is the idea of a degree of freedom. Often students in class are told or in books just stated that in this situation you get this and this and this, with nary an explanation of what this is about. We believe that even in non-calculus-based classes there are reasonably elementary and good explanations for this topic even in regression. In some more advanced books, you get degrees of freedom as the rank of an idempotent matrix where the rank is obtained from the trace of the matrix. This kind of technical proof is not really satisfying. How you teach degrees of freedom obviously depends on the level of the class. We present ideas for both quite elementary classes and for classes where you can use linear algebra. Of course, explanations will revolve around the regression identity  $SSY = SSR + SSE$ . With linear algebra the projection matrix gets you the predictions used in the definition of  $SSR$  and  $SSE$ . If you can use Gram-Schmidt, you can break the projection matrix into its parts where degrees of freedom will amount to simply counting the number of columns in the various parts, something easy to see.

**Keywords:** Standard deviations, degrees of freedom, statistical linear regression, normal equations, basis vectors.

## INTRODUCTION

Of course, statisticians know that  $SSY$  has  $(n - 1)$  degrees of freedom even though the definition of  $SSY$  has the  $n$  terms  $(Y_1 - \bar{Y}), \dots, (Y_n - \bar{Y})$  in it. This is because these terms are related since these deviations from the average always add to zero. One way to explain the degrees of freedom is to say that  $(Y_n - \bar{Y}) = -(Y_1 - \bar{Y}) - \dots - (Y_{n-1} - \bar{Y})$  so that all the information about spread is already contained in the first  $(n - 1)$  deviations. Therefore  $SSY$  is really a function of  $(n - 1)$  numbers and should have  $(n - 1)$  degrees of freedom. While this is a good place to start, it is not a very satisfying and fulfilling explanation. We believe in addition to this, you should show and not just tell that  $SSY$  can always be written as the sum of  $(n - 1)$  terms that are not related. You do need to explain what non-related terms mean. This is done in the next section. Students can then see and look at an expression that shows the terms and they can count the number of terms (degrees of freedom) for themselves. Statisticians define the degrees of freedom for  $SS(\text{Something})$  as the number of unrelated (officially independent) terms that *Something* can be written in. The paper contains the details the authors use in class to teach this topic.

After a discussion of degrees of freedom for the standard deviation, you will move on to regression based on  $SSY = SSR + SSE$ . If a regression printout is shown to the class, students will (hopefully) wonder what this formula is about. Certainly, students first need to get used to this identity before moving on to other things like regression hypothesis tests. In our beginning classes, a longhand calculation with a specific set of data is performed to expose students to these ideas. This identity is then used to explain and show that there are ways to write that  $SSY$  to reflect the different parts of regression. This is presented in the subsequent section. This conversation includes what the parts of this identity are doing. From the class discussion on the standard deviation,  $SSY$  obviously measures the spread in the  $Y$ 's and from the class discussion on the regression line  $SSE$  is used to measure the size of a typical prediction error. It is not so clear what  $SSR$  is doing. Now in simple regression (with one predictor) as can be explained, it is not difficult to show that  $SSR = b^2 \cdot SSX$ , so if the  $X$ 's are considered as fixed then  $SSR$  is a function of the one number  $b$ , the slope. This suggests that  $SSR$  will have 1 degree of freedom so that with  $SSY$  having  $(n - 1)$  degrees this leaves  $(n - 1 - 1)$  degrees of freedom for  $SSE$ . This is all made official by demonstrating with examples and later with formulas that in regression  $SSY$  (different than the  $SSY$  written for the previous paragraph) can be written so that the first unrelated term or terms give you  $SSR$  and the sum the last unrelated terms give  $SSE$ . In non-calculus-based classes this will show students that there is logic behind degrees of freedom. It is something that they can see. It is proof by example, but at least this gives them an idea of what degrees of freedom are about. It is not just a secret that is really difficult to get to.

If you can use linear algebra including the Gram-Schmidt process, then degrees of freedom and distributions become precise. Next is how the appropriate background for this can be described in a more advanced class. For the background used later, suppose you write the theoretical regression model as:  $\mathbf{Y} = \mathbf{X}\boldsymbol{\theta} + \mathbf{e}$ , with  $\mathbf{X}$  containing the (assumed) fixed non-colinear predictor independent variable values. To eventually get to degrees of freedom, take  $\mathbf{X}$  and add on another matrix  $\boldsymbol{\varepsilon}$  so that (in partitioned form)  $[\mathbf{X} \quad \boldsymbol{\varepsilon}]$  forms a basis. Apply Gram-Schmidt to this basis and make each column then produced have length one to get an orthonormal basis  $[\mathbb{X} \quad \mathbb{E}]$  with the helpful and useful properties  $\mathbb{X}^T \mathbb{X} = \mathbf{I}_m$ ,  $\mathbb{E}^T \mathbb{E} = \mathbf{I}_{n-m}$ ,  $\mathbb{E}^T \mathbf{X} = \mathbf{0}$ , where  $\mathbf{I}_p$  is a  $p \times p$  identity matrix,  $m$  is the number of columns of  $\mathbf{X}$  and  $n$  is the number of observations. [ $\mathbf{I}_n$  will be denoted by just  $\mathbf{I}$ .] This orthonormal basis will be used to determine the properties of the estimates  $\hat{\boldsymbol{\theta}}$  of  $\boldsymbol{\theta}$  obtained from the normal equations and to determine the properties of the predicted values  $\hat{\mathbf{Y}}$ . The predicted values come from the projection matrix, denoted and calculated as  $\mathbf{P}_X = \mathbf{X}(\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T$ . For  $\hat{\mathbf{Y}} = \mathbf{P}_X \mathbf{Y}$ , it is easy to show that the original definition of the projection matrix reduces to the simpler expression:  $\mathbf{P}_X = \mathbb{X} \mathbb{X}^T$ . It is probably the case that most students, when they see the derivation of the projection matrix for the first time, wonder what  $(\mathbf{X}^T \mathbf{X})^{-1}$  really does? This expression shows that that inverse takes the columns of  $\mathbf{X}$  makes them perpendicular to each other and then takes those perpendicular column vectors and makes each of them have length one. The predicted  $Y$  are then a function of  $\mathbb{X}$ , and as will be seen, the degrees of freedom for this will amount to counting the number of columns in  $\mathbb{X}$ . For an example of this Gram-Schmidt process and the rest, if

$$\mathbf{X} = \begin{bmatrix} 1 & 2 & 1 \\ 1 & 4 & 1 \\ 1 & 5 & 8 \\ 1 & 6 & 3 \\ 1 & 8 & 7 \end{bmatrix}, \boldsymbol{\varepsilon} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \\ 0 & 0 \\ 1 & 0 \end{bmatrix},$$

then

$$\mathbb{X} = \begin{bmatrix} 1/\sqrt{5} & -3/\sqrt{20} & 0/\sqrt{6} \\ 1/\sqrt{5} & -1/\sqrt{20} & -1/\sqrt{6} \\ 1/\sqrt{5} & 0/\sqrt{20} & 2/\sqrt{6} \\ 1/\sqrt{5} & 1/\sqrt{20} & -1/\sqrt{6} \\ 1/\sqrt{5} & 3/\sqrt{20} & 0/\sqrt{6} \end{bmatrix}, \mathbb{E} = \begin{bmatrix} 3/\sqrt{30} & -1/\sqrt{20} \\ -2/\sqrt{30} & 3/\sqrt{20} \\ -2/\sqrt{30} & 0/\sqrt{20} \\ -2/\sqrt{30} & -3/\sqrt{20} \\ 3/\sqrt{30} & 1/\sqrt{20} \end{bmatrix}.$$

This  $\mathbf{X}$  has an intercept term and two predictor variables. Counting the last two columns in  $\mathbf{X}$  or  $\mathbb{X}$  will be shown to mean that  $SSR$  has two degrees of freedom and the one column for the intercept will give the intercept one degree of freedom. The paper does make some assumptions about normal distributions. Take as fact that if  $\mathbf{e}$  is a random vector with independent  $N(0, \sigma^2)$  components and if  $\mathbf{v}$  is a vector of constants then  $\mathbf{v}^T \mathbf{e}$  is  $N(0, \mathbf{v}^T \mathbf{v} \cdot \sigma^2)$ . Also, if  $\mathbf{w}$  is another vector of constants perpendicular to  $\mathbf{v}$  then  $\mathbf{v}^T \mathbf{e}$  and of  $\mathbf{w}^T \mathbf{e}$  are independent. With the orthogonality above you get lots of nice independent normal random variables, that clearly get you to Chi-Square,  $F$ -, and  $t$ -distributions. This paper forms the mathematical foundation for but is still quite different than Sutrick(2017).

## DEGREES OF FREEDOM IN VERY BEGINNING STATISTICS

This section contains ways that might be used in class to introduce the degrees of freedom topic. Below is the language we use in class for this topic.

What statisticians mean when they say degrees of freedom is illustrated in the next example. Suppose there are six (independent normal) data points and we define a quantity  $SSK$  as:

$$SSK = \left(\frac{Y_1 + Y_2}{2}\right)^2 + \left(\frac{Y_3 + Y_4}{2}\right)^2 + \left(\frac{Y_5 + Y_6}{2}\right)^2.$$

Here each term in  $SSK$  is obviously not related to any other term in  $SSK$ , since there are different data points in each term. Since there are three unrelated terms, statisticians would say that  $SSK$  has three degrees of freedom. If there were a quantity  $SSK'$ :

$$SSK' = \left(\frac{Y_1 + Y_2}{2}\right)^2 + \left(\frac{Y_1 + Y_2}{2}\right)^2 + \left(\frac{Y_5 + Y_6}{2}\right)^2,$$

then even though  $SSK'$  has three terms, some of the terms are now obviously related to other terms as the first two terms of  $SSK'$  are identical. We would not say that  $SSK'$  has three degrees of freedom. However, since  $SSK' =$

$2((Y_1 + Y_2)/2)^2 + ((Y_5 + Y_6)/2)^2$  has two unrelated terms, it could be said that  $SSK'$  has two degrees of freedom. This is basically what statisticians mean when they say 'degrees of freedom'.

By a term, we mean some function of the  $Y$ 's. So, for example since  $\bar{Y} = (Y_1 + \dots + Y_n)/n$  is a one-term function of the  $Y$ 's we could say that  $\bar{Y}$  has one degree of freedom. Far more important than the degrees of freedom for  $\bar{Y}$  are the degrees of freedom for  $SSY$ . By definition,  $SSY = (Y_1 - \bar{Y})^2 + \dots + (Y_n - \bar{Y})^2$  has  $n$  terms but as before they are related terms. However, using algebra  $SSY$  can always be written as the sum of  $(n - 1)$  terms that turn out to be unrelated. In class the authors next establish the following set of algebraic identities (from linear algebra).

For  $n = 2$ :

$$SSY = (Y_1 - \bar{Y})^2 + (Y_2 - \bar{Y})^2 = \left(\frac{Y_1 - Y_2}{\sqrt{2}}\right)^2.$$

For  $n = 3$ :

$$SSY = (Y_1 - \bar{Y})^2 + \dots + (Y_3 - \bar{Y})^2 = \left(\frac{Y_1 - Y_2}{\sqrt{2}}\right)^2 + \left(\frac{Y_1 + Y_2 - 2Y_3}{\sqrt{6}}\right)^2.$$

For  $n = 4$ :

$$SSY = (Y_1 - \bar{Y})^2 + \dots + (Y_4 - \bar{Y})^2 = \left(\frac{Y_1 - Y_2}{\sqrt{2}}\right)^2 + \left(\frac{Y_1 + Y_2 - 2Y_3}{\sqrt{6}}\right)^2 + \left(\frac{Y_1 + Y_2 + Y_3 - 3Y_4}{\sqrt{12}}\right)^2.$$

For  $n = 5$ :

$$SSY = \left(\frac{Y_1 - Y_2}{\sqrt{2}}\right)^2 + \left(\frac{Y_1 + Y_2 - 2Y_3}{\sqrt{6}}\right)^2 + \left(\frac{Y_1 + Y_2 + Y_3 - 3Y_4}{\sqrt{12}}\right)^2 + \left(\frac{Y_1 + Y_2 + Y_3 + Y_4 - 4Y_5}{\sqrt{20}}\right)^2.$$

You can tell students there is an obvious pattern in the numerators, as each term has the form:  $Y_1 + \dots + Y_{(i-1)} - (i - 1)Y_i$  in it. Once students in beginning classes get used to using the square roots,  $(Y_1 - Y_2)/\sqrt{2}$  is not really much different than something like  $(Y_1 + Y_2)/2$ . In class the authors prove these identities with a math package that does symbolic calculations. For each  $n$ , we use a simplify command on the original definition of  $SSY$  on the left side, then use this simplify command on the alternative  $SSY$  on the right-hand side. It is trivial to see that the two simplifications match for each  $n$ . In class the authors do this for  $n = 2, 3, 4, 5$ , and  $6$ . The equations are pre-saved so time is not spent in class typing. With a nice symbolic calculator, it is elegant, sophisticated, something interesting for students to see, provides a valid proof of the identities, takes seconds to present, and does not involve long boring algebraic calculations or any need for something like matrices. The minute or so to do this is enough for students to believe that these kinds of equations exist for any  $n$ . Naturally next it is explained how these particular terms are doing and it is presented how they do what they are doing.

The significance of writing  $SSY$  this way is that these terms turn out to be unrelated, as can be elucidated for the students. At first look this  $SSY$  does not seem much like the  $SSK$  above, but it has more to do with  $SSK$  than you might at first expect. For  $n = 5$ , if you treat the coefficients in front of the  $Y$ 's in this alternative  $SSY$  as vectors, namely  $(1/\sqrt{2})[1, -1, 0, 0, 0]$ ,  $(1/\sqrt{6})[1, 1, -2, 0, 0]$ ,  $(1/\sqrt{12})[1, 1, 1, -3, 0]$ , and  $(1/\sqrt{20})[1, 1, 1, 1, -4]$ , these are perpendicular vectors. For perpendicular vectors knowing the size of one vector tells you nothing about the size of any of the other vectors. This fact about perpendicular vectors when connected to data ultimately results in all the terms of this new expression for  $SSY$  being unrelated. [To take this back to  $SSK$ , the vectors that make up  $SSK$ ,  $(1/2, 1/2, 0, 0, 0, 0)$ ,  $(0, 0, 1/2, 1/2, 0, 0)$ , and  $(0, 0, 0, 0, 1/2, 1/2)$  are perpendicular, kind of like the vectors  $(1, 0, 0)$ ,  $(0, 1, 0)$ , and  $(0, 0, 1)$  are in three dimensions.]

So, for  $n = 5$ ,  $SSY$  is the sum of four unrelated terms signifying  $SSY$  has four degrees of freedom when there are five data points. If there is time, for the vector representation of this  $SSY$  you can see at least a little where the perpendicularity comes from. It is not hard to imagine that these different terms are unrelated since for example  $Y_3$  is in the second term but not in the first term and  $Y_4$  is in the third term but not in the first two terms, and so on. Also, while  $Y_1$  and  $Y_2$  are in both the first term and in the second term they are there in very different forms. It is not hard to envision that  $Y_1 - Y_2$  is quite different than  $Y_1 + Y_2$ , and so on. In  $SSK$  it is obvious that  $Y_1 + Y_2$  is unrelated or independent of  $Y_3 + Y_4$ . While in  $SSY$  it is not at all at first obvious that  $Y_1 - Y_2$  is unrelated or independent of  $Y_1 + Y_2 - 2Y_3$ , but you can show (as is done in advanced classes) that  $Y_1 - Y_2$  is indeed independent of  $Y_1 + Y_2 - 2Y_3$ , and so on. If there were only two data points their range is  $\pm(Y_1 - Y_2)$  and since the range measures spread,  $Y_1 - Y_2$  measures spread. The quantities  $Y_1 + Y_2 - 2Y_3$  and  $Y_1 + Y_2 + Y_3 - 3Y_4$  and so on, are kinds of ranges and likewise measure spread.

Next it can be explained in a beginning class that how to get the square roots is easy to see if you look at the coefficients in front of the  $Y$ 's in each term for this alternative  $SSY$ . The  $\sqrt{2}$  comes from  $2 = (1)^2 + (-1)^2$  since the first term has  $Y_1 - Y_2$  in it, the  $\sqrt{6}$  comes from  $6 = (1)^2 + (1)^2 + (-2)^2$  since the second term has  $Y_1 + Y_2 - 2Y_3$  in it, and so forth. What do the square roots do? The answer is that if you treat the coefficients in front of the  $Y$ 's as vectors, the square roots make these vectors have length one. The significance of the fact that the vectors have length one, means distances are preserved. This means standard deviations are preserved since standard deviations measure spread or distance. For any single  $Y$  from the data set, its standard deviation is  $SD(Y)$ . Because distance is preserved, it is the case that  $SD(Y) = SD((Y_1 - Y_2)/\sqrt{2}) = SD((Y_1 + Y_2 - 2Y_3)/\sqrt{6}) = \dots$ . Write  $Z_1 = (Y_1 - Y_2)/\sqrt{2}$ ,  $Z_2 = (Y_1 + Y_2 - 2Y_3)/\sqrt{6}$ , ... and so on. For  $n = 5$ , we could consequently write  $SSY = Z_1^2 + Z_2^2 + Z_3^2 + Z_4^2$  for four unrelated terms where  $SD(Z_1) = \dots = SD(Z_4) = SD(Y)$ . For  $n = 5$ ,  $SSY$  can be written as though it were made up of four data points not five. In general, for  $n$  data points  $SSY$  can be written  $SSY = Z_1^2 + \dots + Z_{n-1}^2$  meaning that  $SSY$  has  $(n - 1)$  degrees of freedom. The remaining degree of freedom, to get to  $n$  degrees of freedom for  $n$  data points, is in  $\bar{Y}$  which has one degree of freedom. Of course, you can say that in advanced classes all of this is proved with mathematics, but tell beginning students that these are the ideas that make those advanced proofs work. [To be used later in regression, it should be noted that there are many ways to write  $SSY$  as the sum of  $(n - 1)$  unrelated terms. Another example uses the terms  $Y_n - Y_{n-1}$ ,  $Y_n + Y_{n-1} - 2Y_{n-2}$ ,  $Y_n + Y_{n-1} + Y_{n-2} - 3Y_{n-3}$ , etc. Indeed, professors know that if you take any set of length one perpendicular vectors and give them a twist in  $n$ -space and this will give you a different way to represent  $SSY$ . Think of the value of  $SSY$  as the volume of a football as  $SSY$  measures spread or distance or size. Now rotate the football. The size of the football does not change, but the angles you are looking at the football with do change and the parts that write  $SSY$  change. These perpendicular vectors are direction vectors which determine angles.]

These ideas for teaching degrees of freedom extend to regression, all be it more complicated. Obviously start with simple regression by starting with a specific numerical example with data such as  $Y = [17, 15, 35, 19, 49]^T$ , with a single fixed predictor vector  $X = [2, 4, 5, 6, 8]^T$ . This particular  $Y$  data has  $\bar{Y} = 27$ ,  $SSY = 856$ , and a sample standard deviation of  $s_Y = \sqrt{856/4} \approx 14.6$ . Suppose the form of the simple regression equation you use is:  $\hat{Y} = a + bX$ , where  $b$  and  $a$  are to be found. In class after a discussion of what  $RMSE$  is and how it gets you to the best prediction line, the usual equations for the estimated parameters that are presented in class are  $b = r(s_Y/s_X) = SSXY/SSX$  and  $a = \bar{Y} - b\bar{X}$  for  $r = Corr(Y, X)$ . The first expression for  $b$  shows that the correlation shows up in the best predictor, while the second expression for  $b$ , as soon to be seen, turns out to be better for getting to degrees of freedom. For this  $X$  and this particular  $Y$  the fitted regression parameters are  $b = 5$  and  $a = 2$ . Next instead of considering just the above values for  $Y$ , now consider  $Y$  to be variable so that everything becomes a function of the  $Y$ 's and everything becomes more general. In particular with this fixed  $X$ ,  $b = SSXY/SSX$  and  $a = \bar{Y} - b\bar{X}$  are obviously functions of  $Y$ . With algebra (including using a symbolic calculator to simplify) you can show that these slope and intercept formulas are as functions of  $Y$ :  $b = (-3Y_1 - Y_2 + Y_4 + 3Y_5)/20$ , and  $a = (19Y_1 + 9Y_2 + 4Y_3 - Y_4 - 11Y_5)/20$ , no matter what the  $Y$ 's are. Since  $b$  is a one term function of the  $Y$ 's it can be considered to have one degree of freedom and the same for  $a$ .

Now for the regression degrees of freedom based on those sums of squares in the identity. The quantity  $SSY$  has degrees of freedom and so you can say that it induces degrees of freedom on  $SSR$  and  $SSE$ . As mentioned previously, in class the authors spend time on the regression identity. In class for a data set, a complete nine column longhand calculation including columns  $X, Y, \hat{Y}, Y - \bar{Y}, (Y - \bar{Y})^2, \hat{Y} - \bar{Y}, (\hat{Y} - \bar{Y})^2, Y - \hat{Y}$ , and  $(Y - \hat{Y})^2$  is detailed. For the above data, this results in  $SSY = 856$ ,  $SSR = 500$ , and  $SSE = 356$ , so that  $856 = 500 + 356$ , so that  $SSY = SSR + SSE$ . After experiencing this long calculation, it is then that the students are told (and probably willing to accept) that this always happens as long as the regression line is used to make the predictions. After the validity of the identity is (hopefully) accepted, its parts are discussed. Of course, the value of  $SSY$  measures the amount of spread in the  $Y$ 's and  $SSE$  measures the size of the prediction errors made from the regression equation. However, in this it is not at all obvious what  $SSR$  is measuring. To explain to students what  $SSR$  is doing (which is often not done), since  $SSR$  is calculated from  $\hat{Y} - \bar{Y}$  with  $\hat{Y}$  from the regression line, one can write (with the formula for the intercept) that  $\hat{Y} - \bar{Y} = a + bX - \bar{Y} = (\bar{Y} - b\bar{X}) + bX - \bar{Y} = b(X - \bar{X})$ . Therefore, after squaring and summing over all sets of data you get  $SSR = b^2 \cdot SSX$ . So  $SSR$ , with a fixed  $X$ , basically measures the size of  $b$ . [In class we say that if  $b = 0$ , then  $X$  disappears from the regression equation meaning  $X$  is not related to  $Y$ .] Since  $SSR$  is a function of  $b$  and  $b$  has one degree of freedom this suggests that  $SSR$  has one degree of freedom.

To make this more exact, the identity  $SSY = SSR + SSE$  tells us that  $SSY$  can be rewritten to reflect the different parts of regression. For this  $\mathbf{X}$ , no matter what the  $Y$ 's are,  $SSY$  can also be written as:

$$SSY = \left( \frac{-3Y_1 - Y_2 + Y_4 + 3Y_5}{\sqrt{20}} \right)^2 + \left( \frac{Y_2 - 2Y_4 + Y_5}{\sqrt{6}} \right)^2 + \left( \frac{Y_1 + Y_2 - 4Y_3 + Y_4 + Y_5}{\sqrt{20}} \right)^2 + \left( \frac{3Y_1 - 4Y_2 - Y_4 + 2Y_5}{\sqrt{30}} \right)^2.$$

When viewed as vectors all the terms in this rewrite are perpendicular and length one, meaning the terms are unrelated to each other and distance is preserved. For the stated  $\mathbf{Y}$  above, after plugging in, the first term is  $100^2/20 = 500 = SSR$  and the sum of the last three terms is  $26^2/6 + (-40)^2/20 + 70^2/30 = 356 = SSE$ . Since  $SSR$  here comes from one term it has one degree of freedom and since  $SSE$  here is the sum of three unrelated terms it has three degrees of freedom. [With time you could change  $\mathbf{Y}$  and do another regression to see the first term in  $SSY$  again gives  $SSR$ , etc.] At this point it should not be a surprise that this can be done when there are  $n$  sets of data. Of course,  $SSY$  always has  $(n - 1)$  degrees of freedom now split into one term (one degree of freedom) for  $SSR$  and  $(n - 2)$  unrelated terms (degrees of freedom) that always add to  $SSE$ . [In class the symbolic calculator is used to show this latest expression for  $SSY$  when simplified matches the previous simplifications for  $SSY$ . Now how to actually do this rewrite for  $SSY$  obviously looks difficult so you can only tell beginning students that it can be proved (next section) that it can always be done. It amounts to rotating a set of perpendicular vectors for  $SSY$  to get new perpendicular vectors that reflect regression quantities.]

This same technique extends to more than one predictor. For example, in addition to  $\mathbf{X}$ , let fixed predictor vector  $\mathbf{X} = [1, 1, 8, 3, 7]^T$  be a second predictor of  $\mathbf{Y}$ . The vector regression model becomes  $\hat{\mathbf{Y}} = a + b_1\mathbf{X} + b_2\mathbf{X}$ . For the above  $\mathbf{Y}$ , a computer printout will show that:  $b_1 = 2$ ,  $b_2 = 3$ ,  $a = 5$ ,  $SSY = 856$ ,  $SSR = 716$ , and  $SSE = 140$ . Next if  $\mathbf{Y}$  is now considered to be variable, but with  $\mathbf{X}$  and  $\mathbf{X}$  fixed, then you say that you can show (with matrix algebra) that:

$$\begin{aligned} b_1 &= (-9Y_1 + 2Y_2 - 10Y_3 + 8Y_4 + 9Y_5)/60, \\ b_2 &= (-Y_2 + 2Y_3 - Y_4)/12, \\ a &= (57Y_1 + 22Y_2 + 22Y_3 - 8Y_4 - 33Y_5)/60. \end{aligned}$$

Each of  $b_1$ ,  $b_2$ , and  $a$  are one term functions of the  $Y$ 's so each has one degree of freedom.

Analogous to simple regression it is not a surprise that now with two predictors the intercept is  $a = \bar{Y} - b_1\bar{X} - b_2\bar{X}$ . So  $\hat{Y} - \bar{Y}$ , used to compute  $SSR$ , becomes  $\hat{Y} - \bar{Y} = a + b_1X + b_2X - \bar{Y} = (\bar{Y} - b_1\bar{X} - b_2\bar{X}) + b_1X + b_2X - \bar{Y} = b_1(X - \bar{X}) + b_2(X - \bar{X})$ . You can say that  $SSR$  is now a function of the two numbers  $b_1$ ,  $b_2$ , and if you wish to be more exact say  $SSR = SSR(b_1, b_2) = b_1^2 \cdot SSX + 2b_1b_2 \cdot SSXX + b_2^2 \cdot SSX$ . If both  $b_1$  and  $b_2$  are small, meaning neither predictor variable is a very good predictor, then  $SSR$  will be small. Since  $SSR$  is now a function of the two slopes, you would probably think that  $SSR$  should now have two degrees of freedom. To see this more determinatively, the still true relationship  $SSY = SSR + SSE$  tells us that  $SSY$  can be again rewritten in terms of its regression parts. With these two fixed predictors  $SSY$  can be written, no matter what are the  $Y$ 's as:

$$SSY = \left( \frac{-3Y_1 - Y_2 + Y_4 + 3Y_5}{\sqrt{20}} \right)^2 + \left( \frac{-Y_2 + 2Y_3 - Y_4}{\sqrt{6}} \right)^2 + \left( \frac{3Y_1 - 2Y_2 - 2Y_3 - 2Y_4 + 3Y_5}{\sqrt{30}} \right)^2 + \left( \frac{-Y_1 + 3Y_2 - 3Y_4 + Y_5}{\sqrt{20}} \right)^2.$$

[The symbolic calculator verifies that  $SSY$  can be written this way. It amounts to rotating the  $SSY$  vectors in simple regression until they reflect the added predictor variable.] When viewed as vectors all the terms in this rewrite are perpendicular (and length one), so the terms are unrelated to each other. Plugging in  $\mathbf{Y} = [17, 15, 35, 19, 49]^T$ , the sum of the first two terms in  $SSY$  is  $100^2/20 + 36^2/20 = 716 = SSR$ , while the sum of the last two terms is  $40^2/50 + 180^2/500 = 140 = SSE$ . In the symbolic calculator you can pre-define functions  $SSR(\mathbf{Y})$  and  $SSE(\mathbf{Y})$  and then quickly plug in any other  $\mathbf{Y}$  and then compare the results to the regression printout results for the other  $\mathbf{Y}$ . In this case  $SSR$ , the sum of two unrelated terms, has two degrees of freedom and  $SSE$  the sum of two unrelated terms, has two degrees of freedom.

With proof by example, the degrees of freedom in regression for one and two predictors have been found. It is not hard to guess that it can be done for three or more predictors and  $n$  sets of data. In the general case, when there are  $k$  predictors,  $SSR$  will be a function of the  $k$  slopes:  $b_1, b_2, \dots, b_k$  and should have  $k$  degrees of freedom. As shown in the next section, this can be made official since  $SSY$  can always be written as the sum of  $(n - 1)$  unrelated terms where the sum of the first  $k$  terms gives  $SSR$  and the sum of the remaining terms gives  $SSE$ . To get the degrees of freedom for  $SSE$ , the number of remaining terms is  $(n - 1) - k = (n - k - 1)$  so  $SSE$  has  $(n - k - 1)$  degrees of freedom. Finally, if there are  $n$  sets of regression data with  $n$  pieces of information in the  $Y$ 's, we have now accounted for  $(n - 1)$  degrees of freedom with  $SSR$  and  $SSE$ . So, what happened to the remaining degree of freedom? The answer is that the remaining degree of freedom is in the intercept  $a$ .



The above is a long explanation of ideas about teaching degrees of freedom, however while here this explanation seems and is long the class time to present it is not very long at all. These expressions at least show non-mathematical students that there is some logic behind degrees of freedom for the standard deviation and also in regression and it is not just magic. The authors experience in the classroom is that the students in very beginning statistics even have trouble with the idea that  $\bar{Y}$  is a random number, so the concept of a random variable is difficult. The material in this section that is presented to these students does not get much of a physical reaction in class, although the symbolic calculator looks cool. Students at the very elementary level probably cannot really appreciate the importance of perpendicular vectors and independence. However, they can at least see formulas that represent degrees of freedom and can count the number of terms in these formulas. They can see that the calculations involved in this are complicated and they probably don't want to know or even need to know how to derive these expressions. However, they can get the idea that such expressions and explanations for degrees of freedom exist. The really good students even in basic classes will get it, to a large extent, at least to the extent possible without the necessary mathematics, which is offered next.

## LINEAR ALGEBRA, DEGREES OF FREEDOM, DISTRIBUTIONS, FOR MORE ADVANCED

In a lot of books when doing regression, the proof that this sum of squares has this number of degrees of freedom does not exist. In other books the proofs are tedious (including other topics such as UMVU estimates) or non-intuitive such as degrees of freedom being the rank of an idempotent matrix. We believe the following mathematical arguments are a more straightforward easier to see approach that keeps tedium to a minimum. We present it as the language one might use in class. These types of arguments, of course, are well known to statisticians, as they were taught this kind of material when students. If linear algebra is used in teaching regression, a lot of the below will be done in one way or another anyway. Needless to say, in the matrix approach the normal equations lead to a matrix formula for the estimated regression coefficients and lead to a projection matrix that calculates the predicted values used in the definitions of *SSR* and *SSE*. Degrees of freedom will be shown to amount to counting the number of columns in different parts of the projection matrix. This makes degrees of freedom concrete and easy to see and understand. The projection matrix can be derived with linear algebra as in the next paragraph or derived as usual from calculus to get the normal equations or can just be presented with proof by example.

For exposition, we offer the arguments to derive the projection matrix without using calculus. Again, write the theoretical matrix regression model as:  $Y = X\boldsymbol{\beta} + \mathbf{e}$  where  $Y$  is an  $n \times 1$  vector with the  $n$  values of the dependent variable  $Y_i$ , where now the  $X$  matrix has a set of fixed independent non-colinear predictor variable values, where  $\boldsymbol{\beta}$  is the vector of the true regression coefficients, and where  $\mathbf{e}$  is a vector that contains the  $n$  measurement error components. For an arbitrary vector  $\mathbf{b}$ , predictions of  $Y$  using  $\mathbf{b}$ , naturally take the form  $\hat{Y} = X\mathbf{b}$ . Of course, the regression problem is to find that  $\mathbf{b}$  such that  $\hat{Y}$  is as close to  $Y$  as possible, with the criteria for close being *SSE*. Since  $X$  and  $\mathbb{E}$  from the Introduction form a basis, any particular realization of  $Y$  will have the form  $Y = X\boldsymbol{\beta}' + \mathbb{E}\boldsymbol{\gamma}'$ , for some fixed  $\boldsymbol{\beta}'$  and some fixed  $\boldsymbol{\gamma}'$  depending on the realized  $Y$ 's. The vectors  $\boldsymbol{\beta}'$  and  $\boldsymbol{\gamma}'$  will be known once the  $Y$ 's are known. This gives using  $\mathbb{E}^T X = \mathbf{0}$ :

$$SSE = (Y - \hat{Y})^T (Y - \hat{Y}) = (X(\boldsymbol{\beta}' - \mathbf{b}))^T (X(\boldsymbol{\beta}' - \mathbf{b})) + \boldsymbol{\gamma}'^T \boldsymbol{\gamma}'.$$

Since we are trying to minimize *SSE* by choosing the best  $\mathbf{b}$ , the estimated regression coefficients will obviously be given by  $\mathbf{b} = \boldsymbol{\beta}' = \hat{\boldsymbol{\beta}}$  and the estimated coefficients will be uniquely determined since the columns of  $X$  are linearly independent. To find a matrix formula for  $\boldsymbol{\beta}'$  in terms of  $Y$  and  $X$  we only have to solve  $Y = X\boldsymbol{\beta}' + \mathbb{E}\boldsymbol{\gamma}'$  for  $\boldsymbol{\beta}'$ . Multiplying on the left by  $(X^T X)^{-1} X^T$  does the trick:

$$(X^T X)^{-1} X^T Y = (X^T X)^{-1} X^T X \boldsymbol{\beta}' + (X^T X)^{-1} X^T \mathbb{E} \boldsymbol{\gamma}' = \boldsymbol{\beta}' = \hat{\boldsymbol{\beta}}.$$

The predicted values closest to  $Y$  are

$$\hat{Y} = X\boldsymbol{\beta}' = X(X^T X)^{-1} X^T Y = P_X Y,$$

where  $P_X$  is the projection matrix of  $Y$  onto  $X$ , as usual  $P_X X = X$ , along with other properties.

Now to find an alternative simpler expression for the projection matrix. The identity  $SSY = SSR + SSE$  contains  $\hat{Y} = P_X Y$  in both terms on the right. We start the calculation of degrees of freedom by verifying the alternative expression for  $P_X$  in the Introduction. To get to this expression the arguments look like this, first if a matrix  $V$  has an inverse then its projection matrix is the identity matrix as  $P_V = V(V^T V)^{-1} V^T = V[V^{-1}(V^T)^{-1}]V^T = I$ . From the Introduction,  $Z = [X \quad \mathbb{E}]$  is a basis and since  $Span(X) = Span(\mathbb{X})$ , from Gram-Schmidt, so then  $W = [X \quad \mathbb{E}]$  is also a basis. Both  $W$  and  $Z$  have the identity matrix as their projection matrices,  $I = P_W = P_Z$ . Since with block

multiplication  $\mathbf{P}_w = \mathbf{X}(\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T + \mathbb{E}\mathbb{E}^T$  and  $\mathbf{P}_z = \mathbb{X}\mathbb{X}^T + \mathbb{E}\mathbb{E}^T$  then  $\mathbf{P}_x = \mathbf{X}(\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T = \mathbb{X}\mathbb{X}^T$  and  $\mathbf{I} - \mathbf{P}_x = \mathbb{E}\mathbb{E}^T$ . This will shortly lead to degrees of freedom being the counting of the number of columns in  $\mathbb{X}$  and  $\mathbb{E}$ . Often different parts of  $\mathbf{X}$  have different purposes, for example if the model has an intercept term the intercept term tends to be a little different than the slope terms (of the predictor variables). If the columns of  $\mathbf{X}$  can be partitioned into  $\ell$  subsets of interest,  $\mathbf{X} = [\mathbf{X}_1 \ \mathbf{X}_2 \ \cdots \ \mathbf{X}_\ell]$ , then this partition induces a partition on the orthonormal columns of  $\mathbb{X}$ ,  $\mathbb{X} = [\mathbb{X}_1 \ \mathbb{X}_2 \ \cdots \ \mathbb{X}_\ell]$  and it follows  $\mathbf{X}(\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T = \mathbb{X}\mathbb{X}^T = \mathbb{X}_1\mathbb{X}_1^T + \cdots + \mathbb{X}_\ell\mathbb{X}_\ell^T$ .

If a class is advanced enough to use linear algebra and if the model has an intercept term then  $SSY = SSR + SSE$  will be proven outright in class from the definitions of the sums of squares. For exposition, we present one of the possible proofs next. With the previous paragraph this proof is straightforward and gets you easily to degrees of freedom. Needless to say, an intercept means that  $\mathbf{X}$  can be partitioned as  $\mathbf{X} = [\mathbf{1} \ \mathbf{X}]$  where  $\mathbf{1}$  is a vector of 1's and where now  $\mathbf{X}$  contains the fixed values of the  $k$  predictor variables. The model becomes  $\mathbf{Y} = \mathbf{1}\alpha + \mathbf{X}\boldsymbol{\beta} + \mathbf{e}$ , with an intercept coefficient  $\alpha$  and a vector of  $k$  slopes  $\boldsymbol{\beta}$ . The basis  $\mathbf{X} = [\mathbf{1} \ \mathbf{X} \ \mathbf{E}]$ , will be turned into the orthonormal form  $[\frac{1}{\sqrt{n}}\mathbf{1} \ \mathbb{X}_x \ \mathbb{E}]$  where  $Span(\mathbb{X}_x) = Span(\mathbf{X})$ ,  $\mathbb{X}_x^T \mathbb{E} = \mathbf{0}$ ,  $\mathbf{1}^T \mathbb{X}_x = \mathbf{0}$ , and  $\mathbf{1}^T \mathbb{E} = \mathbf{0}$ . These last two results mean that the columns of  $\mathbb{X}_x$  and  $\mathbb{E}$  add to zero, to be used soon. It can now be written:  $\mathbf{I} = (1/n)\mathbf{1}\mathbf{1}^T + \mathbb{X}_x\mathbb{X}_x^T + \mathbb{E}\mathbb{E}^T$  and  $\mathbf{P}_x = (1/n)\mathbf{1}\mathbf{1}^T + \mathbb{X}_x\mathbb{X}_x^T$ . Starting with  $SSE$  in the identity, by definition in matrix form  $SSE = (\mathbf{Y} - \hat{\mathbf{Y}})^T (\mathbf{Y} - \hat{\mathbf{Y}})$ . Since  $\mathbf{Y} - \hat{\mathbf{Y}} = (\mathbf{I} - \mathbf{P}_x)\mathbf{Y} = \mathbb{E}\mathbb{E}^T\mathbf{Y}$ , then  $SSE = (\mathbb{E}\mathbb{E}^T\mathbf{Y})^T (\mathbb{E}\mathbb{E}^T\mathbf{Y}) = \mathbf{Y}^T \mathbb{E}\mathbb{E}^T \mathbb{E}\mathbb{E}^T \mathbf{Y} = (\mathbb{E}^T\mathbf{Y})^T (\mathbb{E}^T\mathbf{Y})$ . This writes  $SSE$  in a nice clarifying way as a function of the random vector  $\mathbb{E}^T\mathbf{Y}$ . Next by definition,  $SSY = (\mathbf{Y} - \bar{\mathbf{Y}})^T (\mathbf{Y} - \bar{\mathbf{Y}})$  and  $SSR = (\hat{\mathbf{Y}} - \bar{\mathbf{Y}})^T (\hat{\mathbf{Y}} - \bar{\mathbf{Y}})$  where  $\bar{\mathbf{Y}} = \bar{Y}\mathbf{1}$ . Since  $\hat{\mathbf{Y}} = \bar{\mathbf{Y}}$  (proof if wanted at the end of this section) this is also  $SSR = (\hat{\mathbf{Y}} - \bar{\mathbf{Y}})^T (\hat{\mathbf{Y}} - \bar{\mathbf{Y}})$  where  $\bar{\mathbf{Y}} = \bar{Y}\mathbf{1}$ . As could be told to students, these last two sums of squares can now be handled with the deviation maker matrix  $\mathbf{D}$ , known as  $\mathbf{D} = \mathbf{I} - (1/n)\mathbf{J}$ , where  $\mathbf{J} = \mathbf{1} \cdot \mathbf{1}^T$  is an  $n \times n$  matrix of all 1's. The deviation maker easily has the properties  $\mathbf{D}\mathbf{1} = \mathbf{0}$ ,  $(\mathbf{Y} - \bar{\mathbf{Y}}) = \mathbf{D}\mathbf{Y}$ ,  $(\hat{\mathbf{Y}} - \bar{\mathbf{Y}}) = \mathbf{D}\hat{\mathbf{Y}}$ ,  $\mathbf{D}\mathbb{X}_x = \mathbb{X}_x$  and  $\mathbf{D}\mathbb{E} = \mathbb{E}$ . Now for  $SSR$ ,  $\mathbf{D}\hat{\mathbf{Y}} = \mathbf{D}\mathbf{P}_x\mathbf{Y} = (1/n)\mathbf{D}\mathbf{1}\mathbf{1}^T\mathbf{Y} + \mathbf{D}\mathbb{X}_x\mathbb{X}_x^T\mathbf{Y} = \mathbb{X}_x\mathbb{X}_x^T\mathbf{Y}$ . Therefore  $SSR = (\mathbb{X}_x^T\mathbf{Y})^T (\mathbb{X}_x^T\mathbf{Y})$  and  $SSR$  is a function of the vector  $\mathbb{X}_x^T\mathbf{Y}$ . Now for  $SSY$ ,  $\mathbf{D}\mathbf{Y} = \mathbf{D}\mathbf{I}\mathbf{Y} = (1/n)\mathbf{D}\mathbf{1}\mathbf{1}^T\mathbf{Y} + \mathbf{D}\mathbb{X}_x\mathbb{X}_x^T\mathbf{Y} + \mathbf{D}\mathbb{E}\mathbb{E}^T\mathbf{Y} = \mathbb{X}_x\mathbb{X}_x^T\mathbf{Y} + \mathbb{E}\mathbb{E}^T\mathbf{Y}$ . Finally, with  $\mathbb{X}_x$  orthogonal to  $\mathbb{E}$ , then  $SSY = (\mathbf{D}\mathbf{Y})^T \mathbf{D}\mathbf{Y} = (\mathbb{X}_x^T\mathbf{Y})^T \mathbb{X}_x^T\mathbf{Y} + (\mathbb{E}^T\mathbf{Y})^T \mathbb{E}^T\mathbf{Y} = SSR + SSE$ , finishing the proof. [The formula for  $SSY$  can be written in the block form  $([\mathbb{X}_x \ \mathbb{E}]^T\mathbf{Y})^T ([\mathbb{X}_x \ \mathbb{E}]^T\mathbf{Y})$ .] While this verification of the identity is a little long, it takes place in straight-forward understandable and interesting steps.

Degrees of freedom and distributions instantly follow. This is the mathematical justification of what was said in previous section and tells you how to produce the formulas for the examples there. Right away  $[\mathbb{X}_x \ \mathbb{E}]^T\mathbf{Y}$  is  $(n - 1) \times 1$  random vector since  $[\mathbb{X}_x \ \mathbb{E}]$  has  $(n - 1)$  columns,  $\mathbb{X}_x^T\mathbf{Y}$  is a  $k \times 1$  random vector since  $\mathbb{X}_x$  has  $k$  columns in it, and  $\mathbb{E}^T\mathbf{Y}$  is a  $(n - k - 1) \times 1$  random vector since  $\mathbb{E}$  has  $(n - k - 1)$  columns in it. Define the  $k \times 1$  vector  $\boldsymbol{\rho}$ , with components  $\rho_i$ , as  $\boldsymbol{\rho} = (1/\sigma)\mathbb{X}_x\mathbf{Y}$  so that

$$SSR/\sigma^2 = \boldsymbol{\rho}^T \boldsymbol{\rho} = \rho_1^2 + \cdots + \rho_k^2.$$

Define the  $(n - k - 1) \times 1$  vector  $\boldsymbol{\xi}$ , with components  $\xi_i$ , as  $\boldsymbol{\xi} = (1/\sigma)\mathbb{E}^T\mathbf{Y}$  so that

$$SSE/\sigma^2 = \boldsymbol{\xi}^T \boldsymbol{\xi} = \xi_1^2 + \cdots + \xi_{n-k-1}^2 \text{ and also } SSY/\sigma^2 = \rho_1^2 + \cdots + \rho_k^2 + \xi_1^2 + \cdots + \xi_{n-k-1}^2.$$

To further what is going on with this, very soon to be seen from orthogonality, each component in  $\boldsymbol{\rho}$  will be independent of any other component in  $\boldsymbol{\rho}$ , each component in  $\boldsymbol{\xi}$  will be independent of any other component in  $\boldsymbol{\xi}$ , and any component in  $\boldsymbol{\rho}$  will be independent of any component in  $\boldsymbol{\xi}$ . Explain to students that this is why the sum of squares  $SSR$  is defined to have  $k$  degrees of freedom and the sum of squares  $SSE$  is defined to have  $(n - k - 1)$  degrees of freedom, and also  $SSY$  is independent of  $SSE$ . The model is  $\mathbf{Y} = \mathbf{1}\alpha + \mathbf{X}\boldsymbol{\beta} + \mathbf{e}$ , with the independent  $N(0, \sigma^2)$  components in  $\mathbf{e}$ . Therefore  $(1/\sigma)\mathbb{E}^T\mathbf{Y} = (1/\sigma)\mathbb{E}^T\mathbf{1}\alpha + (1/\sigma)\mathbb{E}^T\mathbf{X}\boldsymbol{\beta} + (1/\sigma)\mathbb{E}^T\mathbf{e} = (1/\sigma)\mathbb{E}^T\mathbf{e}$  and the components in  $\boldsymbol{\xi}$  are independent  $N(0,1)$  random variables, as the rows of  $\mathbb{E}^T$  are of course orthonormal. Hence this means  $SSE/\sigma^2$  has a Chi-Square distribution with  $(n - k - 1)$  degrees of freedom by definition. Next  $(1/\sigma)\mathbb{X}_x^T\mathbf{Y} = (1/\sigma)\mathbb{X}_x^T\mathbf{1}\alpha + (1/\sigma)\mathbb{X}_x^T\mathbf{X}\boldsymbol{\beta} + (1/\sigma)\mathbb{X}_x^T\mathbf{e} = \boldsymbol{\mu} + \mathbf{z}$ , where vector  $\mathbf{z}$  is defined as  $\mathbf{z} = (1/\sigma)\mathbb{X}_x^T\mathbf{e}$  and vector  $\boldsymbol{\mu}$  is  $\boldsymbol{\mu} = (1/\sigma)\mathbb{X}_x^T\mathbf{X}\boldsymbol{\beta}$ . The random vector  $\mathbf{z}$  has independent  $N(0,1)$  component random variables and is independent of  $\boldsymbol{\xi}$ . Thus

$$SSR/\sigma^2 = \boldsymbol{\rho}^T \boldsymbol{\rho} = (\mu_1 + z_1)^2 + \cdots + (\mu_k + z_k)^2,$$

gets you to a Non-Central Chi-Square distribution with  $k$  degrees of freedom and non-centrality parameter  $\lambda = \mu_1^2 + \cdots + \mu_k^2$ . To be explained in class, this means by definition the  $F$ -test in regression with the test statistic  $F(Stat) = [SSR/k]/[SSE/(n - k - 1)]$  therefore has a Non-Central  $F$ -distribution with  $k$  numerator degrees of freedom and

$(n - k - 1)$  denominator degrees of freedom. As usual under a null hypothesis:  $\boldsymbol{\beta} = \mathbf{0}$ , then  $\boldsymbol{\mu} = \mathbf{0}$ , and  $F(Stat)$  has a standard  $F$ -distribution.

Now with time you could also discuss the distribution of the regression  $t$ -test statistic based on the estimated regression parameters for example as follows. The estimates are given by the  $(k + 1) \times 1$  vector:

$$\begin{bmatrix} \hat{\alpha} \\ \hat{\boldsymbol{\beta}} \end{bmatrix} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{Y} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T [\mathbf{X} \begin{bmatrix} \alpha \\ \boldsymbol{\beta} \end{bmatrix} + \mathbf{e}] = \begin{bmatrix} \alpha \\ \boldsymbol{\beta} \end{bmatrix} + (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{e}.$$

Since the  $e_i$  are mean zero all these estimates are straight-forward unbiased. The estimate  $\hat{\beta}_i$  has the form  $\mathbf{b}_i^T \mathbf{e}$  for the appropriate vector  $\mathbf{b}_i$ . Since  $(\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{E} = \mathbf{0}$ , each  $\mathbf{b}_i$  is perpendicular to every vector in  $\mathbf{E}$  meaning  $\hat{\beta}_i$  is independent of  $SSE$ . Since  $Var(\hat{\beta}_i) = \sigma^2 \mathbf{b}_i^T \mathbf{b}_i = \sigma^2 \mathcal{B}_i^2$  say, then  $\hat{\beta}_i / (\sigma \mathcal{B}_i)$  has a  $N(\beta_i / (\sigma \mathcal{B}_i), 1)$  distribution. The test statistic (for the null:  $\beta_i = 0$ ) looks like:

$$t(Stat) = \frac{\hat{\beta}_i - 0}{\sqrt{\mathcal{B}_i^2 \cdot SSE / (n - k - 1)}}$$

If any regression parameters are truly zero, that  $t(Stat)$  will have a  $t$ -distribution. If any of the true parameters are non-zero then you would explain in an advanced class that  $t(Stat)$  has a non-central  $t$ -distribution with non-centrality parameter  $\lambda = \beta_i^2 / (\sigma^2 \mathcal{B}_i^2)$ . Clearly, there is a parallel argument for the intercept.

[Optionally if desired, if the model has an intercept term then the average of the predicted values is the same as the average of the  $Y$ 's. To exhibit, the calculation can be said to be  $\bar{\hat{Y}} = (1/n) \mathbf{1}^T \hat{\mathbf{Y}} = (1/n) \mathbf{1}^T \mathbf{P}_X \mathbf{Y} = (1/n) \mathbf{1}^T \mathbf{Y} = \bar{Y}$ , since  $\mathbf{P}_X \mathbf{X} = \mathbf{X}$  that implies  $\mathbf{1}^T \mathbf{P}_X = \mathbf{1}^T$  as  $\mathbf{1}$  is the first column of  $\mathbf{X}$ .]

In ANOVA since one-way layouts, two-way layouts, and higher-way layouts can be put into a regression context, showing what degrees of freedom are in ANOVA problems becomes a straightforward extension of the above. This presentation here above mirrors that of Bickel-Doksum(1977) but the presentation here is very different. There they reparametrize the regression parameter space so they can talk about sufficient statistics and UMVU estimates and spend little time on the regression identity. Here we concentrate on the degrees of freedom aspect. They use different basis vectors than here to get to distributions.

## DEGREES OF FREEDOM AS INFORMATION

A possible way of looking at degrees of freedom is in terms of information. A degree of freedom could be considered as a piece of information about a particular statistical situation. If the  $Y$ 's come from a population (not from regression) then the  $n$   $Y$ 's give  $n$  pieces of general information about the population. You can use them to draw a histogram to see the general properties of the sample. The  $n$   $Y$ 's could be considered to have  $n$  degrees of freedom. However, often the  $Y$ 's are transformed in some way to give other kinds of information about the population. For example, given the  $Y$ 's, you can compute the  $n$  numbers  $\bar{Y}, (Y_1 - \bar{Y}), \dots, (Y_{n-1} - \bar{Y})$ . Of course, given  $\bar{Y}, (Y_1 - \bar{Y}), \dots, (Y_{n-1} - \bar{Y})$  you can get  $Y_1, Y_2, \dots, Y_n$  back, as  $Y_1 = \bar{Y} + (Y_1 - \bar{Y})$ , etc. and the last deviation is from the first  $(n - 1)$  deviations. Since you can easily go back and forth, the set  $Y_1, Y_2, \dots, Y_n$  and the set  $\bar{Y}, (Y_1 - \bar{Y}), \dots, (Y_{n-1} - \bar{Y})$  must have the same amount of information but just in a different form. This second set has one degree of freedom in  $\bar{Y}$  for measuring the center of the population and  $(n - 1)$  degrees of freedom for measuring the spread in the population.

The situation is more complicated in regression. In calculating the standard deviation, the deviations from the average have one relationship, that the deviations add to zero. In regression there are multiple relationships among the error terms. As could be explained, define deviation from regression equation vector  $\mathbf{E}$  as  $\mathbf{E} = \mathbf{Y} - \hat{\mathbf{Y}} = (\mathbf{I} - \mathbf{P}_X) \mathbf{Y}$ , then since  $\mathbf{P}_X \mathbf{X} = \mathbf{X}$  it causes  $\mathbf{X}^T \mathbf{E} = \mathbf{0}$ . Thus as  $\mathbf{X}^T$  has  $(k + 1)$  rows there are  $(k + 1)$  simultaneous equations in the  $\mathbf{E}$ , determining the relationships among the  $n$   $E$ 's. Since with no multicollinearity,  $Rank(\mathbf{X}) = (k + 1)$ , then you can find an  $(k + 1) \times (k + 1)$  submatrix of  $\mathbf{X}$  that is invertible. To make it simple, just suppose the last  $(k + 1)$  rows of  $\mathbf{X}$  are invertible and give this part of  $\mathbf{X}$  the name  $\mathbf{X}(b)$ ,  $b$  for bottom. Let  $\mathbf{X}(t)$  be the upper  $(n - k - 1)$  rows of  $\mathbf{X}$ ,  $t$  for top, let  $\mathbf{E}(t)$  be the top  $(n - k - 1)$  entries of vector  $\mathbf{E}$ , and let  $\mathbf{E}(b)$  be the bottom  $(k + 1)$  entries of  $\mathbf{E}$ , then  $\mathbf{X}^T \mathbf{E} = \mathbf{0}$  in block form is:

$$\mathbf{X}(t)^T \mathbf{E}(t) + \mathbf{X}(b)^T \mathbf{E}(b) = \mathbf{0}, \quad \text{or} \quad \mathbf{E}(b) = -(\mathbf{X}(b)^T)^{-1} \mathbf{X}(t)^T \mathbf{E}(t),$$

meaning the last  $(k + 1)$  estimated prediction errors,  $E_{n-k}, \dots, E_n$ , are functions of the first  $(n - k - 1)$  estimated prediction errors,  $E_1, \dots, E_{n-k-1}$ . For the two-predictor numerical example, this is  $\mathbf{E}^T = (5, -1, -4, -7, 7)$  and  $\mathbf{E}(b)$  gives  $E_3 = -(6E_1 + 2E_2)/7$ ,  $E_4 = -(12E_1 + 11E_2)/7$ , and  $E_5 = (11E_1 + 6E_2)/7$ .

With  $\mathbf{X}$  fixed,  $\mathbf{Y}$  is used to estimate the parameters of the regression equation as  $[\hat{\alpha} \quad \hat{\boldsymbol{\beta}}^T]^T = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{Y}$  and then with the estimated parameters you can get the predicted values  $\hat{\mathbf{Y}} = \mathbf{X}[\hat{\alpha} \quad \hat{\boldsymbol{\beta}}^T]^T$  and then with the predicted values you can find the prediction errors  $\mathbf{E} = \mathbf{Y} - \hat{\mathbf{Y}}$ . From  $\mathbf{Y}$ , with fixed  $\mathbf{X}$ , you can calculate  $\hat{\alpha}$ ,  $\hat{\boldsymbol{\beta}}$ , and  $E_1, \dots, E_{n-k-1}$ . However, given  $\hat{\alpha}$ ,  $\hat{\boldsymbol{\beta}}$ , and  $E_1, \dots, E_{n-k-1}$  you can get  $\mathbf{Y}$  back. To get  $\mathbf{Y}$  back, use  $\mathbf{Y} = \hat{\mathbf{Y}} + (\mathbf{Y} - \hat{\mathbf{Y}}) = \hat{\mathbf{Y}} + \mathbf{E}$  since you can get both  $\hat{\mathbf{Y}}$  and  $\mathbf{E}$ . With fixed  $\mathbf{X}$ , knowing  $\hat{\alpha}$  and  $\hat{\boldsymbol{\beta}}$  you can get  $\hat{\mathbf{Y}}$  from  $\hat{\mathbf{Y}} = \mathbf{X}[\hat{\alpha} \quad \hat{\boldsymbol{\beta}}^T]^T$ . Next with knowing  $E_1, \dots, E_{n-k-1}$  you can get  $\mathbf{E}$ , since each  $E_i$  is either one of the first  $E_1, \dots, E_{n-k-1}$  or can be calculated from them through  $\mathbf{E}(b)$ . Given  $\mathbf{Y}$  you can get  $\hat{\alpha}$ ,  $\hat{\boldsymbol{\beta}}$ , and  $E_1, \dots, E_{n-k-1}$ , and given  $\hat{\alpha}$ ,  $\hat{\boldsymbol{\beta}}$ , and  $E_1, \dots, E_{n-k-1}$  you can get  $\mathbf{Y}$  back. The two sets of  $n$  numbers must have the same information since you can easily go back and forth between them. It is the same information just in a different form. The set  $\hat{\alpha}$ ,  $\hat{\boldsymbol{\beta}}$ , and  $E_1, \dots, E_{n-k-1}$  has one degree of freedom in  $\hat{\alpha}$  for the estimated intercept,  $k$  degrees of freedom for the estimated slopes in  $\hat{\boldsymbol{\beta}}$ , giving information about the regression equation, and also has  $(n - k - 1)$  degrees of freedom in  $E_1, \dots, E_{n-k-1}$  for measuring the size of a typical prediction error, measuring how well the regression equation fits the data.

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## BIOGRAPHY

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# Excel Literacy In The Classroom

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## ABSTRACT

This descriptive study aims to assess Excel proficiency among undergraduate students taking a Principles of Economics course. Students analyzed a dataset of 103 Major League Baseball player hit statistics using the Excel functions of SUM, AVERAGE, MEDIAN, SORT, IF, and VLOOKUP. Preliminary results indicate a significant decline in correct responses from simple to complex functions, with statistical differences in sex observed. While male and female respondents had comparably correct answers, the females exhibited lower confidence on average. Additionally, no major ethnic disparities were noted across correct answers or confidence. Future research is suggested to examine potential drivers of the difference in confidence between sexes.

**Keywords:** Excel proficiency, Sex heterogeneity, Principles of Economics, Excel skills assessment

## INTRODUCTION

Microsoft Excel is widely used by businesses across various industries, making Excel knowledge essential for success in the business world (Rebman et al., 2023; Rotondo, 2020; Formby et al., 2017; Pemberton & Robson, 2000). Proficiency in Excel not only supports daily business operations, potentially strengthening student outcomes in the labor market, but also fosters analytical thinking and reasoning among undergraduates when performing calculations (McCloskey & Bussom, 2013). Students, motivated by potential productivity gains, are likely to adopt technological tools to enhance their efficiency (Patterson et al., 2024). This hands-on experience reinforces the material being taught (Barreto, 2015; Ramachandran Rackliffe and Ragland, 2016; Quintela-del-Río and Francisco-Fernández, 2017; Slayter and Higgins, 2018; Barreto, 2018; Patterson et al., 2023). This pairing of reinforced learning and increased applied competency is of value to instructors as a technical skills shortage exists in the labor market among business students (Wymbs, 2016; Elrod et al., 2015). Research by Mentzer et al. (2024), indicates that although incoming college freshmen are thought to be tech-savvy and technologically literate, they lack the data literacy skills needed to succeed at the next level.

This study aims to integrate Excel into the classroom as a learning tool, establishing a foundation for post-graduation work environments. The investigation focuses on assessing a baseline measure of undergraduate literacy in fundamental Excel skills through the deployment of a survey instrument in Principles of Microeconomics courses at a large public university. Students are asked to perform various Excel functions and report their answers in a Qualtrics survey. Results from the survey indicate the potential expanse of technical skills among business students. Future research plans involve a research design using pre-and post-test assessments with interventions throughout the semester to measure the efficacy of advancing the understanding of fundamental Excel skills and their application in critical economic problem-solving.

## LITERATURE REVIEW

Similar studies have reported results comparable to ours in both classroom and professional settings. Approximately 250 psychology students (70 males and 181 females) were assessed for their confidence in answering test questions (Lundeberg et al, 1994). The authors found that while both sexes were significantly overconfident, males were even more overconfident about questions answered incorrectly. In another study, students were asked how they expected to perform on a macroeconomics exam given one week prior (Jakobsson, 2012). Of the 46 males and 52 females surveyed, the females were underconfident compared to the males by more than a 2 to 1 ratio (37% for females and 15% for males). Concerning students' confidence expectations of exam performance, 23% of the females estimated failing the exam compared to only 9% of the males, and the results showed that only 15% of the females failed

compared to 24% of the males. It was determined to be statistically significant that females underestimated their performance, and males overestimated it.

Underconfidence in females and/or overconfidence in males appear to persist even in professional careers. A study of 51 economists at top schools was conducted over 9 years from 2011 to 2020, with 293 questions that spanned over 10,000 observations (Sarsons and Xu, 2021). Females showed self-reported confidence levels 2.2% lower than their male counterparts when making decisions and predictions about the economy and were 7.3% less likely to provide extreme judgments than males.

## SURVEY QUESTIONS

Our instrument provided exercises used to assess student competency in Excel through the identification of six basic Excel functions widely used in business: the SORT, SUM, AVG, MEDIAN, IF, and VLOOKUP functions. Students were asked to (i) sort players alphabetically, in ascending order, by first name and report the 5<sup>th</sup> player; (ii) report the sum, average, and median of home runs; (iii) create a dummy column using an IF statement to denote an indicate if a player hit more than 30 home runs; and (iv) lookup previous year fantasy points for a specific player utilizing the VLOOKUP function. Previous year fantasy points for each player in a separate worksheet. After performing these functions, students were asked to present their findings in the Qualtrics survey. After reporting the answer for each question, students were asked to denote their confidence in obtaining the correct answer. Students had the option to select (i) don't know, (ii) unsure, (iii) pretty confident, or (iv) very confident.

**Figure 1: Worksheet given to students as part of survey instrument**

The screenshot shows an Excel spreadsheet with the following content:

**DATA**

First Name	Last Name	Fantasy Points	Home Runs	Batting Avg	Dummy	Previous Year Points
Corey	Dickerson	202	11	0.243		
Mitch	Garver	200	17	0.254		
Rio	Ruiz	200	11	0.231		
Eric	Sogard	200	9	0.246		
Oscar	Mercado	199	8	0.258		
Freddy	Galvis	199	8	0.23		
Brett	Gardner	196	4	0.241		
Isan	Diaz	194	16	0.239		
Eugenio	Suarez	192	24	0.189		
Kevin	Cron	190	21	0.233		
Tony	Wolters	189	2	0.272		
Brandon	Crawford	189	6	0.226		
Adeiny	Hechavarria	189	8	0.238		
Danny	Jansen	183	11	0.258		
Austin	Meadows	183	12	0.263		
Myles	Straw	182	0	0.262		
Evan	Longoria	182	8	0.243		
Jose	Martinez	181	6	0.304		
Christian	Vazquez	181	11	0.243		
Matt	Joyce	181	10	0.23		
Eddie	Rosario	181	8	0.247		

**Sample Questions**

Using your response to response to Table 1 in the Excel worksheet, what is the Home Runs Median ?

In the column labeled Dummy, use the IFTHEN function within Excel to have your dummy variable equal 1 when Home Runs > 30. Report the sum of

In the column named Previous Year Points, use the VLOOKUP function to copy each player's Previous Year Points from worksheet Previous Player Points.

**Table 1**

TABLE 1 (Report to 2 decimal places)	
5th player	
Last player	
HR Sum	
HR Average	
HR Median	
Description of Trend	
Intercept	
Sum of Dummy variable	
Evan Longoria Previous Player Points	

## DATA

Our sample comprised three semesters (Fall 2021, Spring 2022, and Fall 2022) across seven sections, ranging from 140 to 300 students each, instructed by three seasoned professors, all with significant experience in teaching. Sex, for this study, is defined as the biological assignment at birth (Deaux, 1985), as individual student characteristics obtained by University records only included sex. Students are either classified as female or male for this study as they were not asked which gender they identify with on the survey. Thus, the researchers of this study use the definition of biological sex, as reported to the University upon enrollment, as the reference.

**Table 1: Descriptive statistics**

VARIABLES	N	mean	sd	min	max
Age	758	18.74	1.04	18	25
Male	391	0.52	0.5	0	1
Female	367	0.48	0.5	0	1
White	432	0.57	0.49	0	1
Asian	114	0.15	0.35	0	1
Black	38	0.05	0.21	0	1
Latino	114	0.15	0.36	0	1
Multi	38	0.05	0.22	0	1
NRA	23	0.03	0.18	0	1
Cumulative GPA	758	3.41	0.55	0.69	4

Our panel demonstrates a relatively balanced sex distribution, albeit slightly skewed toward males, than that of the university's overall distribution of 48% male and 52% female. However, the ethnic composition of the sample reflects that of the university's general population. The sample aligns with the typical profile of undergraduate Principles of Microeconomics classes at our institution. With an average age of 18.74, most students are freshmen, with a smaller percentage being sophomores (18 years: 49%, 19 years: 35%, 20 years: 11%, over 20 years: less than 5%). We conducted statistical tests to determine the balance between males and females in our sample. The t-tests of the differences are reported in Table 2 below.

**Table 2: Difference in demographics across sex (t-test)**

	Female		Male		mean diff	p-value
	mean	N	mean	N		
Age	18.738	367	18.737	391	0.002	0.9805
White	0.575	367	0.573	391	0.002	0.9548
Black	0.049	367	0.043	391	0.006	0.7155
Asian	0.155	367	0.138	391	0.017	0.5037
Latino	0.142	367	0.161	391	-0.019	0.4567
NRA	0.041	367	0.026	391	0.015	0.2392
Multi	0.038	367	0.059	391	-0.021	0.1872
Cumulative GPA	3.465	367	3.356	391	0.108	0.0062***

Notably, the only significant difference observed across sexes is in GPA, with females exhibiting a mean increase of +0.11. Our sample aligns with our anticipated student demographics for the undergraduate Principles of Economics course, with no statistical differences across demographic information being present in regard to the two sexes. An elevated female GPA (t-tests indicate a significant difference at the 5% level) is the only statistical difference among the sexes in our sample.

## SURVEY RESULTS

**Table 3: Performance results by sex (T-Test)**

	Female Mean	N	Male Mean	N	mean diff	p-value
Percent Correct	0.511	367	0.514	391	-0.003	0.8977
Cumulative GPA	3.465	367	3.356	391	0.108	0.0062***
Avg Confidence	2.416	367	2.573	391	-0.157	0.0059***

While the proportion correct is not statistically different between females and males, the average level of confidence is notable between males and females. As illustrated in Table 3, the mean percentage of correct answers stands at 51%, with minimal variance between sexes—51.1% for males and 51.4% for females. Given that these individuals are early-career college students, the average percentage of correct answers at 51% appears to serve as a reasonable baseline, and indicative of rudimentary Excel skills. Findings revealed significant results related to average confidence as males

were statistically more confident in their answers, without a significant corresponding increase in the percentage of correct answers.

Next, exhibited in Table 4, we conducted t-tests of differences in the proportion of correct answers by question and found no statistical differences. Despite the GPA differences in our sample, it appears that females and males perform similarly on the entire range of Excel tasks.

**Table 4: Correct by question across sex (T-Test)**

	Female		Male		mean diff	p-value
	mean	N	mean	N		
Correct						
Sort Correct	0.698	367	0.683	391	0.015	0.6628
Sum Correct	0.621	367	0.619	391	0.002	0.9475
Avg Correct	0.597	367	0.586	391	0.011	0.7575
Median Correct	0.523	367	0.568	391	-0.045	0.2181
IF Correct	0.275	367	0.258	391	0.017	0.5997
VLOOKUP Correct	0.351	367	0.371	391	-0.019	0.5801

The pattern of percent correct is consistent with our hypothesis: the scores for the easier Excel functions of sort and sum are higher than for the more difficult questions of IF and VLOOKUP. Finding no difference between males and females in percent correct, we further explored the difference in self-reported confidence between sexes. These results are showcased below in Table 5. We found that, except for the sort command, females were significantly less confident than males, by question, at a rate of approximately 2.5% less confidence, and the difference was statistically significant. The only non-statistical difference, the sort question, was answered correctly by approximately 70% of the participants; therefore, it is likely that males and females showed equal confidence.

**Table 5: Confidence by question across sex (t-test)**

	Female		Male		mean diff	p-value
	mean	N	mean	N		
Confidence						
Sort Confidence	2.970	366	3.005	391	-0.035	0.6367
Sum Confidence	2.737	365	2.900	390	-0.163	0.0389**
Avg Confidence	2.668	364	2.810	390	-0.143	0.0616*
Median Confidence	2.514	364	2.715	389	-0.201	0.0119**
IF Confidence	1.529	361	1.661	383	-0.131	0.0366**
VLOOKUP Confidence	2.102	363	2.327	382	-0.225	0.0081***

Note: Average confidence level when respondent answered the question correctly.

In Table 6, displayed below, when we conditioned confidence on a correct response we found that females were less confident than males when they had a correct response. In Appendix B, we report the result that was conditioned on incorrect responses and found that males and females have no difference in confidence.

**Table 6: Conditional on correct: Confidence difference by sex**

	FEMALE		MALE		Mean diff	p-value
	mean	N	mean	N		
Sort	3.363	256	3.464	267	-0.101	0.0742*
Sum	3.298	228	3.566	242	-0.268	0.0000***
Avg	3.151	219	3.432	229	-0.282	0.0000***
Median	3.172	192	3.410	222	-0.238	0.0013****
IF	2.109	101	2.350	100	-0.241	0.0902*
VLOOKUP	3.178	129	3.524	145	-0.346	0.0002***

Note: Average confidence level when respondent answered the question correctly.

As shown in Table 4, the IF question was the most difficult (lowest average correct answers at 26.7%). Similarly, the confidence level was the lowest for this question, with a minor statistical difference at the 10% level in confidence for



males over females, similar to the sort question that so many of the total student population got correct (incorrect for IF). All of the other confidence questions were significant when correct.

In Table 7 below, we report the effect confidence has on being correct as a proxy of correlation, controlling for age, GPA, and sex. The percent correct for each question was utilized as the target variable in a regression analysis; standard errors are in parenthesis for all regression output, while \*\*\* indicates  $p < 0.01$ , \*\*  $p < 0.05$ , and \*  $p < 0.1$ . We found that being confident (self-reported) was correlated with higher scores (percent correct), and GPA was significantly correlated with higher scores for the more “difficult” questions, as expected. We initially found no significance on GPA with the “easier” questions; nonetheless, it became significant with increasing difficulty, which makes it an intuitive result as covariation with student performance and preparation likely drives both.

It is no surprise, but it is reassuring that if you are confident in your work, you will achieve better results. Note that similar to the t-tests on sex in Table 4, we observe little difference in performance between the sexes, except that males perform worse on questions involving VLOOKUP (5% level) and sort (10% level)

**Table 7: Confidence effect on performance by question**

Dependent Variable: Performance

VARIABLES	(1) Sort	(2) Sum	(3) Avg	(4) Median	(5) VLOOKUP	(6) IF
Cumulative GPA	0.133 (0.187)	0.246 (0.206)	0.337* (0.186)	0.710*** (0.201)	0.371* (0.216)	0.501** (0.199)
Age	-0.233** (0.0952)	-0.132 (0.105)	0.0193 (0.0945)	-0.0111 (0.0993)	0.0463 (0.121)	0.117 (0.0856)
Male	-0.158 (0.206)	-0.375 (0.229)	-0.333* (0.198)	-0.00999 (0.209)	-0.517** (0.246)	-0.275 (0.189)
Sort Confidence	1.663*** (0.122)					
Sum Confidence		2.247*** (0.156)				
Avg Confidence			1.752*** (0.124)			
Median Confidence				1.913*** (0.130)		
VLOOKUP Confidence					2.176*** (0.147)	
IF Confidence						1.180*** (0.112)
Observations	757	755	754	753	745	744

We observe similar results when we consider the effect of self-reported confidence on overall performance (un-tabulated regression results controlling for GPA, which was significant), where we continue to see similar significance between confidence and performance at greater magnitudes.

Next, in Table 8, we report the effects of performance on self-reported confidence. The effect of being male on confidence was largely strong at the question level, consistent with the unadjusted means and t-tests in Table 5, except for the easiest question (sort), where many answered correctly.

With the dependent variable as confidence by question, we observe similar significance and magnitude gains on the variable of interest: confidence on the question was positively related to responding correctly, but almost no significance on GPA, and males were more confident conditioned on the correctness of response, as we observe in Table 6.

**Table 8: Performance effect on confidence by question**

VARIABLES	(1) Sort Confidence	(2) Sum Confidence	(3) Avg Confidence	(4) Median Confidence	(5) IF Confidence	(6) VLOOKUP Confidence
Cumulative GPA	0.128* (0.0764)	0.129* (0.0771)	0.0174 (0.0764)	-0.00623 (0.0766)	0.00117 (0.0847)	-0.101 (0.0798)
Age	0.0260 (0.0401)	0.0396 (0.0407)	0.00492 (0.0392)	0.0459 (0.0397)	0.0880** (0.0406)	0.0141 (0.0415)
Male	0.111 (0.0828)	0.306*** (0.0840)	0.249*** (0.0818)	0.207** (0.0825)	0.211** (0.0896)	0.257*** (0.0861)
Sort	1.638*** (0.0986)					
Sum		2.107*** (0.105)				
Avg			1.685*** (0.0940)			
Median				1.872*** (0.0970)		
IF					1.150*** (0.0979)	
VLOOKUP						2.221*** (0.106)
Observations	757	755	754	753	744	745

Finally, we investigated differences across ethnicities for confidence and correct correlations and found only limited effects concerning performance and nothing of note with confidence across ethnicities. In the t-test, reported in Table 9, only Whites and Latinos were statistically different from the others, with Whites outperforming on every question and Latinos underperforming. NRA stands for Non-Resident Alien.

**Table 9: Correct by Question across Ethnicity (T-Test)**

	Out of Group		Group		mean_diff	p-value
	mean1	N1	mean2	N2		
<b>GROUP: White</b>						
Percent Correct	0.464	323	0.548	435	-0.084	0.001***
Sort Correct	0.622	323	0.740	435	-0.118	0.001***
Sum Correct	0.576	323	0.653	435	-0.077	0.031**
Avg Correct	0.551	323	0.621	435	-0.070	0.054*
Median Correct	0.505	323	0.577	435	-0.072	0.048**
IF Correct	0.220	323	0.301	435	-0.081	0.012**
VLOOKUP Correct	0.313	323	0.398	435	-0.085	0.016**
<b>GROUP: Black</b>						
Percent Correct	0.514	723	0.481	35	0.033	0.572
Sort Correct	0.694	723	0.600	35	0.094	0.239
Sum Correct	0.620	723	0.629	35	-0.009	0.915
Avg Correct	0.591	723	0.600	35	-0.009	0.912
Median Correct	0.548	723	0.514	35	0.033	0.698
IF Correct	0.266	723	0.286	35	-0.020	0.793
VLOOKUP Correct	0.367	723	0.257	35	0.109	0.189
<b>GROUP: Asian</b>						
Percent Correct	0.511	647	0.524	111	-0.013	0.699
Sort Correct	0.689	647	0.694	111	-0.004	0.927
Sum Correct	0.618	647	0.631	111	-0.012	0.804
Avg Correct	0.584	647	0.631	111	-0.046	0.359
Median Correct	0.543	647	0.568	111	-0.025	0.625
IF Correct	0.269	647	0.252	111	0.017	0.714
VLOOKUP Correct	0.360	647	0.369	111	-0.009	0.852
<b>GROUP: Latino</b>						
Percent Correct	0.531	643	0.409	115	0.122	0.000***
Sort Correct	0.700	643	0.635	115	0.065	0.165
Sum Correct	0.644	643	0.487	115	0.157	0.001***
Avg Correct	0.617	643	0.443	115	0.174	0.000***
Median Correct	0.571	643	0.409	115	0.162	0.001***
IF Correct	0.281	643	0.183	115	0.099	0.027**
VLOOKUP Correct	0.373	643	0.296	115	0.078	0.111
<b>GROUP: NRA</b>						
Percent Correct	0.517	733	0.387	25	0.130	0.059*
Sort Correct	0.704	733	0.280	25	0.424	0.000***
Sum Correct	0.622	733	0.560	25	0.062	0.530
Avg Correct	0.595	733	0.480	25	0.115	0.251
Median Correct	0.547	733	0.520	25	0.027	0.790
IF Correct	0.269	733	0.200	25	0.069	0.445
VLOOKUP Correct	0.364	733	0.280	25	0.084	0.389
<b>GROUP: Multi</b>						
Percent Correct	0.513	721	0.495	37	0.018	0.754
Sort Correct	0.693	721	0.622	37	0.072	0.357
Sum Correct	0.619	721	0.649	37	-0.030	0.714
Avg Correct	0.588	721	0.649	37	-0.061	0.465
Median Correct	0.544	721	0.595	37	-0.051	0.545
IF Correct	0.270	721	0.189	37	0.081	0.276
VLOOKUP Correct	0.366	721	0.270	37	0.096	0.237

Extending the Ethnicity investigation using a regression model similar to sex, with the black, multi, and non-resident alien groups being dropped due to lower observation counts (<40), we observe white performance gains persisting, but the Latino effect diminishing. The regression controlled for age and GPA, with GPA still significantly and positively correlated with performance. This control is likely what accounted for the Latino underperformance from the t-tests, since Excel ability or preparation (experience) might be correlated with GPA, especially for a smaller subset of the population (15%).

**Table 10: Regression Results**

	(1)	(2)
VARIABLES	Question Percent	Confidence Avg
Cumulative GPA	0.0379*** (0.0145)	-0.0145 (0.0342)
Age	-0.00518 (0.00756)	0.0139 (0.0178)
White	0.0492** (0.0240)	-0.0816 (0.0565)
Asian	0.0265 (0.0293)	-0.0344 (0.0688)
Latino	-0.0205 (0.0290)	-0.00446 (0.0682)
Average Confidence	0.332*** (0.00973)	
Percent Correct		1.832*** (0.0537)
Constant	-0.377** (0.156)	1.399*** (0.364)
Observations	758	758
Adj R-squared	0.624	0.614

In the regression results, the Latin indicator was not statistically significant, as compared to the t-tests. Therefore, it appears that ethnicity may not have any effect on results (performance) or confidence, except that whites tend to outperform the comparison group of NRA. To further test this on a question-by-question level, we found in untabulated results that the White effect was strongly due to the sort question (easiest), and weakly due to VLOOKUP and IF (the most difficult). The Ethnicity results suggest that minimal to no effect of ethnicity exists on our instrument on Excel.

## DISCUSSION

These results allowed us to observe differences across demographics, which may drive insights into targeting populations that may be at technical disadvantages. Ethnicity had no persistent significant effect on performance or confidence. The most interesting results are across sexes, with little evidence of a difference in performance between sexes in both t-tests and regression results, but significant differences in overall confidence when conditioned on being correct. We also found confidence to correlate with performance in both sexes.

The natural questions are as follows: Can we find a way to make females more confident in their work, and will this lead to greater performance? Or, is the issue females having the right level of confidence and males having an inflated level of confidence? This led us to reconsider our Excel performance instrument to make it more sex inclusive. Rather than asking sports-related questions, we thought future instruments might use the same underlying data and rename the statistics along the lines of Human Resource data. Instead of Fantasy Points, Home Runs, and Batting Average, we could call them the Annual Review Score, Project Successes, and Project Success Average. We intended to investigate whether the contextual setting of the question had some differential effect between sexes by presenting more sex-neutral or sex-friendly examples (different consumer products, perhaps).

While the baseline results of Excel skills at 51%, on average, for the Excel tools selected were not significant, it presents an opportunity for improvement by using Excel as a teaching aid in the economics, and business, classroom. Combining examples that illustrate theories with rudimentary Excel functions provides students with basic Excel skills in a useful and familiar context. This type of involvement in a “learning by doing” process has the potential to increase engagement and reduce calculation anxiety.

## CONCLUSION

The study assesses the current baseline Excel literacy amongst undergraduates in Principles of Microeconomics courses in hopes of targeting areas of improvement to enhance both Excel proficiency and career skills. Our validation results showed no sensitivity to ethnicity but indicated a significant difference in confidence, albeit not performance, between sexes. This makes us reconsider our instrument and interventions (Excel-based exercises) to be more sex inclusive for future research. As such, we plan to implement these changes in our next data collection phase and compare them with the analysis reported in this paper.

The baseline level of Excel skills among undergraduate students at the outset of their college journey was unexpectedly high, averaging 51% correct across six basic functions. This leaves ample room for growth in developing these critical skills, which are highly sought after by employers, by integrating them into the instruction of introductory-level economics courses. Furthermore, we aim to enhance our Excel skills assessment by incorporating two additional skills: Linear Regression and Pivot Tables, based on insights from alumni working in relevant professional fields.

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## APPENDIX

### Appendix A: GPA Breakdown by Sex

GPA>	Total		Male		Female	
3.7	289	38%	130	33%	159	43%
3.3	217	29%	120	31%	97	26%
3	112	15%	60	15%	52	14%
2.7	59	8%	30	8%	29	8%
2.3	52	7%	31	8%	21	6%
2	12	2%	8	2%	4	1%
1.7	4	1%	2	1%	2	1%
1.3	5	1%	4	1%	1	0%
1	5	1%	4	1%	1	0%
Below 1	3	0%	2	1%	1	0%
Totals	758		391		367	
Average	3.409		3.358		3.429	

The average GPA was above B+ (3.41), with that of males statistically lower than females by a tenth of a point or a tenth of a full letter grade.

### Appendix B: Conditional on INCORRECT: No confidence difference by sex

	FEMALE		MALE		Mean diff	p-value
	mean	N	mean	N		
Sort	2.055	110	2.016	124	0.038	0.7835
Sum	1.803	137	1.811	148	-0.008	0.9420
AVG	1.938	145	1.925	161	0.012	0.9087
Median	1.779	172	1.790	167	-0.011	0.9018
IF-THEN	1.304	260	1.417	283	-0.113	0.0448**
VLOOKUP	1.509	234	1.595	237	-0.086	0.2169

# Academic Integrity Violation Statistics and Initiatives: One Business School's Experience

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## ABSTRACT

Violations of universities' codes of academic integrity appear to be on the rise. There are a variety of possible reasons for such an increase as well as different approaches a college may take to combat the problem. This paper looks at one business school's experience in dealing with the issue, including gathering data on the extent of the problem and implementing initiatives to reduce the amount of cheating.

**Keywords:** academic integrity, cheating, business school, awareness, consequences

## INTRODUCTION

Academic integrity at universities is essential to ensure fairness and to maintain the value of their academic credentials. Further, there is evidence that students who engage in dishonest acts in college classes are more likely to engage in dishonest acts in the workplace (Nonis and Swift, 2001). Thus, by promoting academic integrity, universities can build a foundation of honesty and accountability that translates into greater integrity after graduation.

There are reports, however, that academic dishonesty at universities is increasing. One article headline says it all, "Cheating at School Is Easier Than Ever—and It's Rampant" (Hobbs, 2021). In that article, Hobbs notes that academic integrity cases have doubled at NC State and Texas A&M and have risen 71% at the University of Pennsylvania. Hobbs also cites the case of dozens of U.S. Military Academy cadets at West Point who were caught cheating on an online calculus exam. In absolute terms, a March 2020 survey found that 32% of undergraduate students admitted to cheating on an exam, 25.1% admitted to using unauthorized electronic resources on assignments, and 28% admitted to working on assignments with other students when the instructor asked for individual work (Rettinger et al., 2024). Overall, the International Center for Academic Integrity (2024) reports that "more than 60 percent of university students freely admit to cheating in some form." Evidence also exists that undergraduate business students cheat even more frequently than their nonbusiness peers (McCabe, 1997).

This paper summarizes the academic integrity policy applied by a major undergraduate business program (Undergraduate Business Program) and uses the Undergraduate Business Program as a case example to provide insights regarding the prevalence of reported academic integrity violations and the assessed severity of the alleged offenses. The appeals process, the frequency and success of student appeals, and the consequences of students being found accountable are described. The paper also reports the Undergraduate Business Program's recent policy changes regarding the student consequences for academic integrity violations and summarizes two initiatives to increase awareness and education regarding academic integrity.

## THE UNDERGRADUATE BUSINESS PROGRAM AND ITS ACADEMIC INTEGRITY POLICY

We examined academic integrity violations within the Undergraduate Business Program for the period from Summer 2020 to Spring 2024. During that period, the Undergraduate Business Program enrolled an average of roughly 1,700 full-time students per year. In addition, a small subset of students from outside the Undergraduate Business Program enrolled in undergraduate business classes through programs for business minors, adult learners, and others.

The Undergraduate Business Program follows the academic integrity policy of the university. Three relevant aspects of the policy for purposes of this paper include:

### **Class I and Class II violations**

Faculty members who allege that an academic integrity violation has occurred must also make a preliminary assessment of whether the violation is “Class I” or “Class II.” “Typically, violations of the Academic Integrity Code are treated as Class I violations, but in cases which are less serious or where there are mitigating circumstances, the violation may be treated as a Class II violation...If a student has previously received a violation (either Class I or Class II), then all subsequent violations will normally be held to be Class I violations.”

### **Right of appeal**

“If the student denies that an academic integrity offense has occurred...the chair of the Board of Academic Integrity will assemble a panel consisting of three faculty and two student members of the Board of Academic Integrity. The panel will make a determination (based on a preponderance of the evidence) of whether academic dishonesty has occurred.”

### **Consequences**

The distinction between Class I and Class II violations is important. Students found responsible for two Class I violations will be dismissed from the university, “absent extenuating or mitigating circumstances.” In all other cases, grade and other penalties are imposed. At the time the alleged violation is reported, the instructor may impose a grade penalty up to and including failure in the course. Students who are found responsible for a violation receive the assigned grade, which the students can appeal for reasons such as inconsistency with the instructor’s stated policy regarding grading and academic integrity. In addition, “[t]he student’s dean (or designee) will supervise a program of education and reflection on the meaning and importance of academic integrity....The student's dean (or designee) may also impose or recommend additional disciplinary penalties.”

## **ADDITIONAL UNIVERSITY AND BUSINESS SCHOOL POLICIES AND PROGRAMMING**

The university has engaged in new initiatives with potential to improve academic integrity. As of Fall 2023, completion of an online academic integrity program is required for all incoming students. In addition, the university has increased mental health resources and began allowing students “personal day” absences during 2024. Among other things, the potential reduction of student anxiety could result in improved student responses to academic pressure.

Furthermore, the Undergraduate Business Program has made three major changes aimed at reducing academic integrity violations:

### **Academic Integrity Education**

The Undergraduate Business Program implemented a new academic integrity education program starting in Fall 2021. The education was deemed essential because some students are not ready to deal with the academic rigor and pressure of the college environment and are not familiar with proper academic conduct and tradition (Hart & Freisner, 2004; Macdonald & Carroll, 2006). Also, academic misconduct and plagiarism need to be defined, and the discipline policy publicized to all students (Livermore, 2009). As part of the program, freshmen orientation for business students now includes a morning dedicated to academic integrity. Students rotate to different breakout groups and participate in activities centered on the importance of academic integrity from a variety of viewpoints. Students hear from students, faculty members, and administrators who have been harmed by others’ academic integrity violations, and they hear the words of students who have admitted to violations. The event culminates in students reciting an academic integrity pledge and signing a pledge book. Follow-up education is delivered in the form of short videos and discussion in selected core courses during the students’ remaining time in the Undergraduate Business Program. Informal student response to the orientation event has been positive, but there is no empirical evidence of the overall education program’s effectiveness.

Faculty also need to understand their university’s discipline policy, including the definitions of academic misconduct and plagiarism (Livermore, 2009). Thus, it is important to note that in some schools, it may be that faculty are not fully aware of their school’s academic integrity policies (Macdonald, et al., 2006). To address this concern, a senior dean of the Undergraduate Business Program held meetings with each department to update faculty on current academic policy and the revised academic integrity program.



### **Introductory Business Law and Ethics course**

As part of the follow-up education to reinforce the messaging presented in freshmen orientation, the Undergraduate Business Program has implemented an interactive exercise focused on academic integrity in a required introductory business law and ethics course. After learning about ethical approaches such as utilitarianism, deontology, and virtue ethics, students work in small groups to apply a decision-making framework based on those ethical approaches to analyze the decision to cheat on an assignment. Afterwards, students provide anonymous feedback in which they must identify reasons why cheating occurs, how cheating impacts other stakeholders, and if/how their participation in the exercise affected their opinions about cheating. Students report the exercise gave them either a new or expanded understanding of how cheating hurts not only the cheater and their immediate classmates, but also the faculty, future employers, the school's reputation, and other stakeholders impacted by either the cheater or the school. By identifying the circumstances which give rise to cheating, students are better prepared to anticipate those circumstances and avoid reaching the point where cheating appears to be their best option.

While Bloodgood, et al. (2010) found that taking a business ethics course does not have a significant effect on a student's views regarding cheating, McGill (2008) suggests that integrating academic integrity content into the business law course may decrease incidents of academic misconduct by addressing four key reasons why students cheat: "It will teach them the rules, dispel any impression of faculty tolerance or peer acceptability, and warn students of the serious consequences of cheating."

### **Enhanced consequences for violations**

The Undergraduate Business Program has recently exercised its allowed discretion to impose penalties above those required at the university level. Potential benefits might include a deterrence effect, signaling that academic integrity is essential; increased fairness to honest students; and the learning and growth of the penalized students.

Specifically, students now receive the following penalties when found responsible for an academic integrity violation within the Undergraduate Business Program:

#### *Education program*

The student must complete an education program with their program's Associate Dean (Class I and II Violations). This is a continuation of the preexisting policy.

#### *Honor Society Restriction*

Starting in Fall 2024, a student found responsible for a violation cannot join any business honor society (such as Beta Gamma Sigma, Beta Alpha Psi, or Omega Delta Epsilon). Additionally, an academic integrity violation is grounds for dismissal from academic honor societies (Class I Violation; Class II Violations at the discretion of the program Associate Dean in consultation with the society's faculty director).

#### *Grade Penalty*

Starting in Fall 2024, students found responsible receive a grade of zero for the relevant work. No alternate or makeup work may be provided to mitigate or replace the grade impact of the zero for the work (Class I and II Violations).

#### *Final Grade Impact*

Starting in Fall 2024, the student's final course grade is calculated based on the maximum penalty of one full grade level drop (e.g., A to B, B+ to C+) OR the final course average including the zero for the deliverable, whichever is lower (Class I Violation; Class II Violation at the discretion of the faculty member).

The "final grade impact" provision is the most novel of the revised policy, and thus warrants additional explanation. During internal discussions regarding penalties for academic integrity violations, the concern was frequently raised that the grade penalty for cheating on low-stakes assessments was inadequate. For example, if a student was assigned a grade of 0% for cheating on a homework assignment that comprises 1% of the student's final grade, then there was a high likelihood the student's final overall letter grade would not be impacted. Students were thus potentially more likely to cheat on such assignments, knowing that the penalty for eventually getting caught on an assignment would be minimal. The new policy also emphasizes that all cheating undermines the fundamental principles of learning and integrity.

## **SUMMARY OF VIOLATIONS DURING THE PERIOD**

Table 1 summarizes the academic integrity violations reported by faculty in the Undergraduate Business Program for

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the period Summer 2020 to Spring 2024.

**Table 1: Reported Academic Integrity Violations (Summer 2020 – Spring 2024)**

Semester	Reported Violations			Number Appealed	Successful Appeals
	Total	Class 1	Class 2		
Summer 2020	4	4	0	4	4
Fall 2020	16	12	4	0	0
Spring 2021	12	10	2	0	0
Summer 2021	1	1	0	0	0
Fall 2021	4	3	1	0	0
Spring 2022	10	9	1	1	1
Summer 2022	0	0	0	0	0
Fall 2022	12	6	6	0	0
Spring 2023	31	20	11	8	8
Summer 2023	1	0	1	0	0
Fall 2023	0	0	0	0	0
Spring 2024	4	2	2	0	0
Overall	95	67	28	13	13

Several observations can be made from this information:

**Small Volume of Cases**

Ignoring summer sessions, there is an average of 23.75 cases per academic year, involving less than 1.4% of all business students on average. This is highly inconsistent with evidence cited earlier that over 60% of university students admit to cheating (International Center for Academic Integrity, 2024). Many possible explanations exist for the low volume of cases, including (a) differences in cheating levels between schools due to the cultural or policy differences, (b) a high rate of undetected cheating, and/or (c) a high rate of faculty members choosing not to formally submit cases. Confidential discussions with faculty members within the Undergraduate Business Program indicate that nonreporting by faculty does indeed contribute to some degree to the small volume of cases. For instance, one faculty member noted they do not formally report incidents for which there is a preponderance of evidence (the university standard during appeal proceedings) but not completely irrefutable proof. This is consistent with Keith-Spiegel et al. (1998) who surveyed 127 psychology instructors and found that concern of insufficient evidence was the most commonly cited reason for overlooking academic integrity violations. Consistent with the research of Hamilton and Wolsky (2022), one faculty member in the Undergraduate Business Program cited fear of confrontation as a reason for not reporting an incident, and other faculty members expressed concerns that reporting violations could negatively impact course evaluations and tenure applications. An additional faculty member reported ignoring a cheating incident due to fear of personal safety. Going forward, concerns that the punitive aspects of the new policy implemented in Fall 2024 may be excessive raise the possibility that faculty might become even more hesitant to report violations.

**Small Percentage of Appeals**

Most reported violations (86.3%) do not get appealed. This is highly consistent with the research cited above. To the extent that faculty members are concerned about insufficient evidence, it follows that faculty members will be much more likely to report cases when the evidence is especially strong and unlikely to be appealed. Similarly, to the extent

that faculty members have concerns about the appeals process (see the next section), it follows that faculty members will be more likely to report academic integrity violations in cases where the probability of an appeal is low.

### **100% Successful Appeals Rate**

For the few cases that were appealed during the period Summer 2020 to Spring 2024, all thirteen appeals were successful. This outcome could reflect students only investing time and energy into pursuing appeals that they strongly believe they will win. Additionally, three faculty members who have gone through the appeals process all expressed feeling unsupported by the process, despite believing that their evidence easily met the “preponderance of evidence” standard employed by the university. This perceived lack of support, along with the stress and time commitment of the process, has resulted in two of the three faculty members stating that they will not report future incidents. This observation is concerning and is consistent with McCabe (1993) who surveyed 789 faculty members at 16 institutions and observed “a modest level of overall dissatisfaction” with the way in which reported instances of suspected cheating are handled and argues there is a “direct relation between such dissatisfaction and the probability one would report future incidents.” Similarly, a factor analysis of faculty survey responses by Keith-Spiegel et al. (1998) finds that “Difficult” academic integrity reporting issues, including “[a] lack of institutional support through the accusation/resolution process,” contribute to the decision by faculty members to ignore cheating. Given the importance of this issue, we recommend that future research address ways to increase faculty confidence in formal academic integrity reporting processes.

### **Surge in Cases During the 2022-2023 Academic Year**

There was a very notable surge in cases during the 2022-2023 academic year. A possible contributing factor is the educational campaign by the senior dean in Fall 2021 to inform faculty about the academic integrity policy, which would be consistent with research indicating that faculty needed to be familiar with institutional procedures to maintain academic integrity (Coalter, et al., 2007). Additionally, prior research suggests that an increase in academic integrity violations can be driven by relatively poor student academic performance. In short, “[students] achieving lower grades and those who are failing, or at the risk of failing, are more likely to commit misconduct than top performing students” (Miles et al., 2022).

Consistent with this latter argument, we note that student performance in at least two core business courses in the Undergraduate Business Program was exceptionally low during the 2022-2023 year. Indeed, the extent of the low performance resulted in a very large number of students not meeting the prerequisite standards needed to proceed to higher level courses. The reasons for the drop in student performance are not known. The impacts of Covid-19 on mental health and education (Jenkins et al., 2023) and on the admissions process are possible factors.

### **Technology-based Assignments Result in the Most Freshmen Violations**

Our source data provides additional detailed data for freshmen only, which indicates there were thirteen reported violations by freshmen during the period from Summer 2020 to Spring 2024. We note that the majority of these cases involved online assignments. For one course (accounting for seven violations), the technology used to assign and collect Excel homework assignments also facilitates the identification of academic integrity violations. The finding that a high proportion of violations stem from online assignments is consistent with three arguments. First, the increased use of online instruction and assessment present greater opportunities for cheating (Bierstaker, et al., 2024, King, et al., 2009, Fish, et al., 2020, Pisnar, 2023). Such opportunities include the increased availability and use of answers found through online academic resource sites, such as Chegg (Pleis, 2024). Second, we argue that the use of technology to review such assignments for academic integrity violations can result in more violations being detected. Third, using technology to detect academic integrity violations can provide sufficiently strong evidence to mitigate faculty concerns regarding insufficient evidence, which addresses the issue raised by Keith-Spiegel et al. (1998) that lack of sufficient evidence is the most common reason for not reporting violations.

## **CONCLUDING COMMENTS**

This research provides case data from Summer 2020 to Spring 2024 for an undergraduate business program regarding academic integrity violation reports and their resolution. Data supports the argument that academic integrity violations are significantly underreported. The observation that very few cases are appealed supports the notion that faculty are hesitant to report cases without irrefutable evidence. The finding that every student appeal was successful during the relevant period lends credence to existing concerns by faculty members that they will not be supported during an appeals process. There also is some evidence to suggest that the use of online assignments might result in increased reporting of cheating incidents, not only due to increased cheating, but also due to the ability of technology to provide sufficiently strong evidence to give faculty confidence that academic integrity violation charges will not be dismissed.

This study also provides information regarding the Undergraduate Business Program’s academic integrity policy, recent changes to that policy, and two substantial initiatives to both educate students and faculty and to promote a culture of integrity. Knowledge of these policies and programs should be useful to other institutions as they address academic integrity concerns; and capturing and analyzing data regarding the effectiveness of such changes is an important area for future research.

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# Using a Virtual Reality 360-Camera for Experiential Learning: A Study Abroad Case Study for Business Students

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## ABSTRACT

**Purpose-** The study aims to identify if the usage of a 360-Camera by business students enhances their study abroad experience. **Findings-** The case study revealed two major themes: 1.) Enhanced Learning Experience: Students reported that the 360-Cameras allowed them to capture more details and provided a fuller perspective of the sites visited. 2.) Cultural Sensitivity: Students demonstrated maturity in knowing when and where it was appropriate to film. **Recommendations-** Future studies could include a 360-Camera for each student researcher to further examine individual differences. Also, host additional training sessions for more exploratory learning of the equipment where students are empowered to teach each other how to effectively use the equipment. **Value-** Educators must adapt to new, evolving technology and innovative media to provide experiential and interactive opportunities to a student's learning experience. 360-Cameras allow students to be fully immersed in their own learning experience.

**Keywords:** virtual reality, business education, study abroad, experiential learning

## INTRODUCTION

Virtual reality (VR) technology allows participants to experience events, visit famous sites, or perform physical feats without the time and travel cost often associated with these leisure activities. Restrictions due to financing, physical impairments, travel time or workload can be overcome in a virtual environment (Kaleci, Tepe, & Tuzun, 2017). VR has increased in popularity due to the sensation of feeling mentally immersed in a simulation which allows users to experience situations and interact with other users as if they were physically present (Van-den Bor, Slond, Liesdek, Suyker, & Weldam, 2022). This 3-dimensional environment has proven to be useful in a wide variety of applications from education to medicine to engineering (Yetim, Argan, & Dinç, 2023; Betts, Reddy, Galoyan, Delaney, McEachron, Izzetoglu, & Shewokis, 2023).

What was once a novelty, VR has now become a useful tool for educators. As learning in an online format continues to increase, VR has become a valuable tool for educators especially when teaching practical skills not easily or ethically performed in person (Jensen & Konradsen, 2018). In a specific type of VR, 360-degree video technology, participants are immersed in a computer-generated environment which can allow them to fully interact with objects, other participants, and their environment (Crumpton & Harden, 1997). For example, medical procedures or crisis management can be repeated to help improve techniques and problem-solving skills without the cost or use of actual patients (Craig & Kay, 2023; Shadiey, Yang, and Huang, 2022). This type of VR also has been used by educators to simulate sociocultural environment to help ease students learning a new language (Chen & Hwang, 2020) or to virtually visit foreign national landmarks to aid in learning about other cultures (Chang, HSU, Kuo, & Jong, 2020). The use of VR has become a cost-effective supplement to enhance the e-learning environment (Ulrich, Helms, Frandsen, & Rafn, 2021).

## LITERATURE REVIEW

The use of technology in the higher education classroom is ever evolving. Digital pedagogies including using VR in and out of the classroom has increased after the COVID-19 pandemic (Tsekhmister, 2022). A VR system was defined by Melo, Gonçalves, Monteiro, Coelho, Vasconcelos-Raposo, and Bessa, (2022) as providing consistent perceptual feedback that corresponds with the actions taking place in a virtual, digital, artificial environment. The typical purpose of using VR is to fully immerse the user's senses in a digitally created environment providing the opportunity for an

interactive experience (Kohr, Baker, Amin, Chan, Patel, & Wong, 2016). In recent years, this type of technology has been implemented as part of an overall training method to create a virtual environment to practice “real-world” events, helping participants gain confidence, enhance critical thinking skills, and improve problem-solving ability (Hwang, Chang, & Chien, 2022).

A key element of VR is its interactivity, allowing users to engage with and respond to virtual objects and environments. Developing these opportunities for hands-on practice helps create a sense of satisfaction and accomplishment. Tsekhmister (2022) suggested that “self-produced films allow for peer-to-peer learning by sharing and discussing the outcomes of the videos, as well as the opportunity for self-reflection as part of the process of building professional clinical abilities” (p.145). The use of self-produced films, in addition to classroom instruction, provides additional opportunities for students to receive valuable feedback and enhance the learning of various skills (Tsekhmister, 2022).

**Benefits of Using VR in Educational Settings.** Former studies suggest that students using VR report potential positive learning outcomes from supplementing traditional teaching methods with this technology. In a review of 332 studies, Craig and Kay (2023) suggested an enhanced learning experience, improved skill acquisition, and improved behaviors that support learning can be associated with immersive virtual reality. This type of VR can be cost-effective and reduce risk to participants while also providing a supportive learning environment and increasing the motivation to learn. Likewise, Shadiev, Yang, and Huang (2022) suggested in their review of research that 360-degree video was reported by scholars as “very-realistic, affordable, and mobile” (p. 794). Participants reported their experience to be “authentic and immersive” (Shadiev, Yang, and Huang, 2022, p.794).

Virtual reality and 360° videos are transforming user experiences and practices across various fields, including higher education, where they offer new immersive and visual stimuli for educators. Today, the global sports and tourism technology market, which includes VR and other forms of integrated media content, is expected to reach USD 40.22 billion by 2028 (Iyer, Pavlik, & Jin, 2022). VR content, such as virtual facility tours and interactive tourist destinations, allows users to experience and interact with virtual worlds, enhancing the sensory quality of immersion. Studies, like those by Yung et al. (2021), demonstrated that VR can evoke stronger positive emotional responses compared to traditional media, highlighting the importance of engagement over photorealistic advancements. Uhm et al. (2020) emphasized the necessity of creating immersive physical environments to enhance VR experiences in many fields. Furthermore, creating these alternative forms of media content, using immersive technologies, can shape positive destination images, influencing potential tourists' travel decisions (Goebert, & Greenhalgh, 2020). In the realm of higher education, educators must adapt to computer-mediated technologies and immersive media, as these provide numerous opportunities to deliver an engaging and interactive experience to their student audience.

**Challenges of using VR in Educational Settings.** Some challenges were also identified when implementing VR technology. Some participants reported feelings of isolation or disconnection from instructor and peers (Craig & Kay, 2023; Ulrich, Helms, Frandsen, & Rafn, 2021). Interactivity with the teacher or peers to ask questions, for example, is limited when using VR and could lead to challenges in facilitating communication compared to traditional teaching methods. Social interaction and note-taking are difficult in some uses of VR which could negatively impact learning (Craig & Kay, 2023). Ulrich, Helms, Frandsen, and Rafn (2021) suggest that this type of immersive VR be used to complement traditional teaching. In addition, some users of this technology reported “cyber sickness, distraction from actual learning, and poor video quality as potential issues (Shadiev, Yang, & Huang, 2022).

Other identified challenges when implementing VR in the classroom are technological issues, cost, and lack of training. Support staff and additional training with both hardware and software applications for both educators and participants could offset any cost savings (Craig & Kay, 2023). Higher education professors may be hesitant to use this type of technology in the classroom due to their perceived and actual digital skills being inadequate (Antón-Sancho, Vergara, & Fernández-Arias, 2024). Craig and Kay (2023) suggested education administrators must allocate sufficient training time for faculty and students and provide technical support systems to help ease use of this type of technology.

Although the effectiveness of VR has been studied when students are part of a digital immersion experience led by an instructor in a variety of academic fields and applications, the effect on students' overall experiences while using a 360-Camera is not fully understood. The purpose of this study is to investigate how the use of a 360-Camera influences the learning experience of business college students on a study abroad trip.

## RESEARCH QUESTIONS

- How does the use of a 360-Camera influence students' overall learning experiences during study abroad programs?
- How do students navigate cultural sensitivity when using a 360-Camera in different environments?

## METHODS

The population consists of college students in the United States participating in a study abroad trip. The specific sample comprises of 5 graduate and 19 undergraduate sport management students (N = 24; 12 females, 12 males) attending a 9-day study abroad trip to Germany and the Netherlands. The students' ages ranged from 18 to 50 years. Participants were selected based on enrollment in at least one of the following courses during the spring of the 2024 semester, SMG 435 Global Perspectives in Sport, BUS 210 Study Tour, or FM 211 Clothing and Culture.

From the pool of 24 participants, four student researchers volunteered to participate, receiving no monetary compensation but offered involvement in future research and presentation opportunities. Volunteers were selected based on their willingness to be part of the research study. These researchers received comprehensive training on the Insta360 X3 camera, chosen for its ability to capture 360-degree video and still photos. The training included a 30-minute workshop covering basic operation, advanced features, and creative techniques. Students were provided with a step-by-step guide and FAQs, which outlined basic setup, video and photo capture, audio setup, and an outline of the components included in the Insta-360 package.

The student researchers were instructed to capture their experience creatively, without specific direction aside from recording their experience to the best of their ability. Guidelines included keeping videos short and ensuring privacy and anonymity of individuals and groups. Ethical considerations were addressed through HSRB approval and informed consent obtained from all participants and subjects featured in the vlogs.

The trip itinerary included visits to Munich, Germany and Amsterdam, Netherlands, focusing on Allianz Arena, BMW Welt and Museum, Dachau Concentration Camp Memorial, Neuschwanstein, Linderhof Castle, and various walking tours. Throughout the trip, researchers used the Insta360 X3 camera to document their experiences and interactions, capturing vlogs and still images. Students were asked to record any time they had the opportunity, ensuring cultural sensitivity and respect.

After the trip concluded, the 19 undergraduate sport management students were asked to complete a mixed-methods electronic survey to record their experiences of the study abroad trip with the inclusion of the 360-degree camera. Students had one week to complete the survey.

**Data Analysis.** Post-trip, the vlogs and still images were submitted to the research team on SD cards. Analysis was conducted using Insta360 studio. The analysis process involved loading the videos and still images into the software and sorting by type and activity in accordance with the trip itinerary in preparation for the focus group discussion.

After returning from the trip, the student researchers participated in a 60-minute focus group via Microsoft Teams with the rest of the research team. Additionally, short written narratives were collected from the student researchers via email. The focus group transcript was analyzed using Claude 3.5 Sonnet, an AI language model, to identify major themes using the prompt "identify the major themes from the attached focus group transcript." The two major themes uncovered were: "Enhanced Learning Experience" and "Cultural Sensitivity."

Once the themes were established, the researchers used the prompt "Using the attached transcript, find content and quotes pertaining to Cultural Sensitivity: Students demonstrated maturity in knowing when and where it was appropriate to film, avoiding sensitive locations like concentration camps and religious sites." The identified themes were then cross-referenced with the written narratives and video content to ensure consistency and validity of findings.

In addition to the vlogs and focus groups of student researchers, data was collected to better understand the overall impressions of traveling in a study-abroad group with a 360-camera. After the trip, undergraduate students completed an electronic survey, which included quantitative Likert scale questions along with open-ended responses. There were 10 questions on the survey. For the quantitative data, the mean scores for each Likert scale question were calculated to determine the average level of agreement or disagreement across all respondents. These means provided insights into the overall attitudes and perceptions of students toward the use of the 360-camera during the trip. The Likert scale items were averaged out and analyzed using Claude 3.5 Sonnet to identify overall data trends. Open-ended responses

were analyzed qualitatively to capture themes and additional insights into the students' experiences. The open-ended questions were also analyzed using Claud 3.5 Sonnet.

## RESULTS

**Qualitative Analysis.** The case study uncovered two major themes from the four student researchers:

- **Enhanced Learning Experience:** Students reported that the 360-Camera allowed them to capture more details and provided a fuller perspective of the sites visited.
- **Cultural Sensitivity:** Students demonstrated maturity in knowing when and where it was appropriate to film, avoiding sensitive locations like concentration camps and religious sites.

**Enhanced Learning Experience.** Implementing 360-Camera technology in study abroad trips allow for a transformative experience, enhancing both the capture and review of their dynamic footage. Student researchers reported that the 360-Camera significantly improved their ability to document their surroundings. This innovative approach to filming allowed the students to focus more on their experiences and less on the technical aspects of recording. As they became more proficient with the technology, students found that their prior training quickly became relevant. The ability to control the camera via their phones further streamlined the capture of high-quality footage. The 360-Camera technology not only enriched the students' documentation capabilities but also fostered a more immersive and reflective learning experience throughout their trip.

The student researchers found that the 360-Camera significantly enhanced their ability to capture and review their experiences. One student researcher mentioned, “We’re pulling this stick all the way up. I’m trying to get just like the best view overall. And I think after that was a whole different thing than just actually using it.” They appreciated the ability to control the camera via their phones, which made it easier to capture high-quality footage without constantly adjusting the camera manually. Using the 360-Camera allowed them to focus more on the experience itself and less on the technical aspects of filming.

The students’ efforts to fully utilize the 360-Camera’s capabilities were evident. By “pulling this stick all the way up,” they aimed to capture the best possible view, indicating their desire to leverage the technology to its fullest extent. This proactive approach enhances the quality of their documentation and learning experience. The phrase “trying to get just like the best view overall” emphasizes the importance of perspective in their recordings. The 360-Camera allowed for a more immersive and comprehensive view of the environment, which significantly enriched the learning experience by providing a more detailed and holistic understanding of the sites visited.

The statement “after that was a whole different thing than just actually using it” suggests that the students’ experience evolved from merely operating the camera to creatively and strategically using it to capture meaningful content. This shift from novice usage to advanced application reflects a deeper engagement with the technology and the learning process. The quote indicates an active learning process where students experiment with different ways to use the camera. The hands-on approach fostered critical thinking and problem-solving skills as they figured out how to achieve the best results.

Another student researcher mentioned, “Once we it was even really halfway through this day where we really started capturing things. We were like, Oh, we, like you said, like that training, like the stuff we did out in the quad. Just knowing how to work the camera kind of just came back and it was, easy as pie after that.” This underscores the importance of prior training and practice. The students’ ability to recall and apply their training (“like the stuff we did out in the quad”) demonstrates how initial instruction and hands-on practice can significantly enhance their ability to use new technology effectively.

Students’ confidence grew the more familiar they became with using the 360-camera. This confidence is reflected in the phrase “easy as pie,” indicating that the technology initially seemed challenging became manageable and even enjoyable as they gained proficiency. The transition from struggling to capture footage to doing so effortlessly allowed the students to engage more deeply with their surroundings. This shift likely enhanced their overall learning experience, as they could focus more on the content and context of their recordings rather than the technical aspects of using the camera. The quote also suggests a reflective learning process. The students recognized the value of their training and how it facilitated their ability to capture meaningful footage. This reflection is crucial for deep learning, as it helps students understand the connection between their actions and outcomes.



**Cultural Sensitivity.** The student researchers demonstrated exceptional cultural sensitivity and maturity in their approach to using the 360-Camera during their trip abroad. Their collective decision-making process was vital in navigating the complexities of filming in diverse cultural contexts, showing a deep understanding of the importance of respecting local customs, historical sites, and religious spaces.

Sensitivity was evident in their approach to historically significant and emotionally charged locations like the Dachau concentration camp memorial. The students unanimously decided to forgo filming at this site, recognizing that the experiences transcend the need for documentation. One student stated, "We probably could have filmed it, but we chose as a group to honor what had happened." This decision reflects the understanding of the balance between educational documentation and reverence for historical tragedy.

Similarly, the students showed great respect for religious sites and active places of worship. They were acutely aware of the primary function of these spaces and chose not to film in any religious or memorial sites. One student noted, "We already knew some of the churches were not... It seemed every single time we went into a church, there was a service." This awareness led to a blanket decision to prioritize engagement with these sites' cultural and spiritual aspects over documentation.

The students' commitment to respecting local rules and avoiding potential conflicts further illustrated their maturity as international visitors. They proactively made decisions to avoid challenging situations, as one student explained, "We're just not going to put ourselves in a situation where we have to be... Almost in a sense of intimidation because we are in a different country." This approach allowed them to focus on their educational experience while positively representing their institution.

Throughout their trip, the students consistently demonstrated an ability to discern between appropriate content for their educational task and moments that called for quiet reflection or respect. Their thoughtful use of technology, guided by cultural sensitivity, enhanced their learning experience and contributed to their development as responsible global citizens. This approach to international travel and cultural engagement sets a commendable example for future educational excursions.

## **STUDENT RESEARCHER TESTIMONIES**

**Student 1.** "Traveling with the [university] College of Business and Economics abroad to Germany and the Netherlands this summer was an opportunity and experience that I will never forget. Along with the educational benefits of learning about the different cultures and sports-related practices globally, I also made lifelong friendships that will always be connected to the trip. Studying abroad was made even better with the opportunity to be a part of the VR 360 Camera team and having the chance to record my experience!"

"Contrary to my initial beliefs, I became very comfortable using and controlling the VR 360 Camera on the trip. Using the camera, I felt myself and the rest of the team of researchers were able to successfully record short videos that best depicted the natural life and experience of a German and Netherlands citizen. Along with the videos and their ability to be used educationally, I also left with high-definition videos that will forever encapsulate my friend's and I's trip and the memories we made on it!"

**Student 2.** "During my study abroad trip, we experienced two different countries. This included Munich Germany as well as Amsterdam Netherlands. I had the unique opportunity to document parts of our journey with our 360 VR Camera. This technology allowed me and my group to capture our experiences throughout the trip. While in Germany we used the 360 cameras in multiple settings. Some of these places included Neuschwanstein and Linderhof castle, as well as walking around the city of Munich. This camera allowed us to capture an entire 360 view. This included the inside of the stadiums, getting the videos of the fields, and getting the reactions of the people around us. When at the castle we captured the breath-taking view from the bridge and were able to see all the wilderness that surrounded such a beautiful area."

"While in the Netherlands we visited John Crujiff Arena, the canals, Zaanse Schaans, and the city of Amsterdam. While inside of the stadiums, we captured videos of the fields, and getting the reactions of the people around us. We continued our journey onto a boat tour and got to film the canals of Amsterdam. We got to see the water, the people, the bicycles, and the scenario that surround us through the canal ride. During the Zaanse Schaans we got to see all the

windmills and learn how they worked. We got to capture the way they were set up and the smiles of others enjoying the views. While on our walking tour we got to film the streets of Amsterdam and the city life. We captured the differences of culture compared to ours. While on the trip it was hard to film in certain situations due to being respectful of the culture. The overall usage of the camera was incredibly unique. It allowed us to really focus on what we wanted to film as well as enjoy getting to film and share our experiences with others. Being able to bring back footage that others may never get to experience is especially important so others can enjoy it as well.”

**Student 3.** “Being a part of the student research group traveling to Germany and the Netherlands provided me with valuable insights to both international travel and the integration of technology in research. Although several students and staff were not part of this trip, the 360 videos we captured allowed us to share our experiences from a unique perspective. While sharing our experiences through these videos, I was transported back to those locations, allowing me to relive and share the sights and sounds we saw. In addition, I gained practical skills in using a 360 camera, which I had no prior experience with. This opportunity has equipped me with expertise that I can now apply to various aspects of my academic and professional careers.”

**Student 4.** "Using the 360 VR camera to capture memories in Amsterdam, Netherlands and Munich, Germany was transformational. It completely opened my eyes to a whole new way to present and experience new locations. When researching this project prior to the experiment, I was filled with curiosity but also a sense of anxiety because I wasn't sure exactly what would happen when we began filming. Would strangers look at us weird like funny tourists? Would the camera work the way we want?

“All of these questions would be answered the week we spent overseas. I remember the excitement of telling my family about how I was able to capture not just myself in front of a beautiful castle but all the landscape surrounding it. Or how I was able to show them exactly what I saw in the streets of Amsterdam. All in all, I was extremely thankful to go outside of my comfort zone and explore a new side of sport management not seen very often.”

Furthermore, data was analyzed from a mixed methods electronic survey completed by undergraduate student attendees (79% response rate). The electronic survey included three open-ended questions for comments.

**Table 1: Open Ended Question Results**

Question	Interpretive Result
"How did the 360-video recording process distract or enhance your learning experience?"	Most participants found the 360-camera to be positive, non-distracting and beneficial. Most responses indicated that it enhanced their awareness, engagement with the environment, and ability to relive and preserve memories. There were minimal responses who mentioned minor distractions.
"Was there a specific event or location that you wished/hoped we recorded?"	The overall theme from the collective responses was that participants appreciated the 360-video recording process. Some participants desired more coverage of specific events or locations they found meaningful.
"Overall, what was the positive or negative impacts of the use of 360-video recording on your study abroad trip?"	Universally, using the 360-video recording was perceived very positively. It enhanced the experience by preserving memories, deepening cultural understanding, and providing a fun and unique way to document and share the journey. No negative impacts were identified, and participants expressed gratitude and excitement about the ability to reflect on their trip through the recorded footage.

### Quantitative Analysis

In addition to analyzing data from the four-student focus group and narrative, all undergraduate student attendees were asked to complete a mixed-methods electronic survey after the trip. The survey had a high response rate with 15 out

of 19 participants responding (79% completion). The survey was a mix of quantitative (Likert scale) and qualitative (open-ended) responses.

**The Likert scale data.** The ratings range from 1 to 5, where 1 indicated the lowest level of the characteristic measured and 5 indicated the highest level.

**Table 2: Likert Scale Data**

Likert Question	Mean	Standard Deviation (SD)	Interpretation
To what extent were the 360-degree video recordings distracting during your study abroad trip?	1.06	0.25	A mean close to 1 suggests that the videos did not interfere with their study abroad experience.
To what extent did the 360-video project enhance your educational experience on your trip?	4.20	1.01	A mean of 4.20 indicates that most participants felt the videos added considerable value to their learning.
How involved were you in the video capture process?	2.26	1.53	The mean suggests there was a range of involvement levels, with some feeling less engaged than others.
How comfortable were you being part of the 360-video capture project?	4.73	0.59	A mean of 4.73 indicates high comfort levels, suggesting that they were at ease during the video capture.
Do you believe that the recording process respected the local culture?	4.73	0.59	This high mean suggests confidence in the project's cultural sensitivity.
Overall, did the 360-video project affect your learning experience during the study abroad trip?	2.30	1.75	The mean indicates a mix of opinions, with some feeling it had little effect while others felt more strongly about its impact.

## DISCUSSION

The overall aim of this study was to investigate whether business students benefit from using a virtual reality 360-Camera to enhance their study abroad experience. The data highlights that the 360-video recording process was a positive addition to the learning experience. Most participants found it to be non-distracting and beneficial, it enhanced their awareness, encouraged engagement with the environment, and their ability to relive and preserve memories. While a small number mentioned minor distractions, these were outweighed by the perceived benefits, including increased cultural understanding and skill-building. The process served as both an educational tool and a meaningful way to document the trip. According to the quantitative survey data, the 360-camera served as an educational tool with high educational enhancement (4.20/5.0) and low disruption (1.06/5.0). After evaluating this research study, four “opportunities for success” emerged from developing and implementing this type of innovative immersive experience.

**Integration of Technology.** The use of 360-Camera technology in study abroad programs offer significant opportunities for learning. This immersive technology gives students the chance to further understand themselves and their surroundings. As with any new technology, it is crucial for users to acquaint themselves with its features and uses. To maximize 360-Camera technology applications, pre-trip training sessions are essential. These practices allow students to focus less on managing the equipment and focus more on their surroundings, thus enhancing their overall learning experience. These sessions should include best practices for effective video and photo capture, proper

technology etiquette, and safety measures associated to the handling of the equipment. Providing resources such as tutorials, troubleshooting guides, and technical support during the trip will also ensure that students can fully utilize the technology during their study abroad program.

**Cultivating Cultural Sensitivity.** Future study abroad trips should continue to provide immersive experiences with other cultures. The feedback from the students suggests that integrating cultural sensitivity training into pre-departure orientations can help students better circumnavigate the various environments they may encounter. The quantitative survey data, from the undergraduate student attendees, indicated that the 360-camera validated their cultural respect with a score of 4.73/5.0. Given this feedback, it might be beneficial for educators to provide students with more participatory classroom engagement opportunities that include cultural sensitivity exercises. Embedding these exercises into a class where the focus is to introduce and encourage students to reflect on their cultural interactions can foster cultural respect and impact students' roles, as global participants, in a positive and transformative way. Moreover, the exercises can be adaptable to the instructor's teaching style and the students' level of global competency. By appropriately modifying cultural sensitivity exercises, students have an opportunity to consider their own understanding and appreciation of various sensitive issues with the newly encountered culture's.

**Nurturing Adaptability.** Students who can navigate technological challenges, global awareness, and use a 360-Camera, illustrate the value of fostering proactive learning and adaptability. Through this research study students enhanced their confidence while using the technology. Whether that confidence was gained by trial by error or through normal channels of teaching and instruction, it allowed them to focus more on engaging with their environment rather than struggling with technical issues. To support this kind of learning, it is beneficial to create opportunities for students to experiment with new technologies in a controlled setting before applying them in real-world scenarios. Encouraging experimentation within a supportive environment helps build problem-solving skills and confidence. Incorporating unique opportunities, like the use of 360-Camera while studying abroad, can further refine and improve the educational experience. These opportunities support alternative ways of thinking and doing and provide a space to practice imperfectly which increases the likelihood that future students benefit from continuous improvements.

**Enhancing Immersive Learning Experience.** This study supports an increasing need to develop pathways where immersive technology can be used as an integrated part of a student's educational journey. These types of immersive experiences can provide students with a deeper appreciation for contexts that might not be experienced within the boundaries of a typical classroom. Students want and need these integrated learning experiences, and the 360-Camera provides an innovative and immersing tool for educators to utilize to expand the usual educational environment. Having virtual technology options to use in the classroom is useful when building a cost-effective and an efficient way to create an integrated learning experience. Incorporating assignments that utilize 360-Cameras, such as virtual tours or reflective video essays, can help students leverage the technology for educational purposes. This immersive technology provides students with another application to better understand new concepts and ideas, use technology for learning, and view their environment from a different perspective.

## **FUTURE IMPLICATIONS**

The integration of 360-Camera technology in study abroad programs present promising opportunities for enhanced learning experiences. First, the effectiveness of this technology heavily relies on students' familiarity and proficiency with its use. Despite having multiple pre-trip training sessions, where students familiarized themselves with the equipment, there may still be some variability when it comes to their technical skills and comfort levels while using the technology in a new environment. Leaders should be cognizant that not every student learns in the same way. Although pre-trip training sessions as a group are important, allowing students one-on-one with the equipment can foster independent growth. Second, prepare students to be comfortable in the uncomfortable. Integrating immersive technologies into unfamiliar environments and cultures can be challenging. Allow students to fully leverage the technology during their study abroad experiences, by giving them pre-trip projects that put them into new environments where they can practice navigating uncertainty. Use role-playing exercises, public speaking engagements, and group activities to simulate uncomfortable situations while navigating the nuances of the technology. This allows students to practice and build confidence in handling such scenarios. Last, design customizable cultural sensitivity training specific to study abroad destinations. This tailored approach to training can better address the diverse cultural contexts students may encounter abroad. These implications highlight the importance of continuous support and adaptation in educational practices.

## CONCLUSION

This type of cross-cultural experience, intertwined with 360-Camera training and cultural orientations, can help students navigate complex cultural settings more effectively. Additionally, encouraging students to reflect on their cultural interactions can foster cultural respect and impact their role, as a global participant, in a positive and impactful way. It is critical that future student leaders have the global competency to work with and within a wide variety of cultures. The use of 360-Cameras in this study abroad experience enabled students to gain a better understanding of diverse cultures, customs, and practices. It provided an opportunity for students to communicate and engage through an interactive medium, while learning to support and practice the importance of being culturally sensitive.

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# Blast from the Past: The Resurrection of MoviePass

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## ABSTRACT

A previously-published article traced the rise and fall of theatrical film subscription service MoviePass (Angert, 2021), but several interesting developments have transpired since its publication. Most salient to the domain of strategic management is the recent revival of the MoviePass brand with original co-founder Stacy Spikes's retaking the helm. This piece details major new developments that have occurred following the 2019 shuttering of the original MoviePass and highlights the new, more conservative 2024 approach that the company has elected to employ. Sample questions that instructors may wish to consider for possible discussion are included in the appendix.

**Keywords:** strategy, entrepreneurship, upper echelons theory, resource-based view, agency theory, institutional theory, MoviePass

For a brief time in the late 2010s, MoviePass captured the zeitgeist and became a phenomenon. With its iconic red cards, audiences flocked to theaters to enjoy films on the big screen, as the company's unparalleled value proposition of a service that would allow subscribers to see a movie in theaters every day, all for one low flat monthly fee, captured the attention of moviegoers and made MoviePass a hot commodity. Unfortunately, mismanagement, missteps, and more led, as documented in the literature, to MoviePass's demise (Angert, 2021). In November 2021, however, MoviePass co-founder Stacy Spikes acquired the bankrupt company's assets, with plans to relaunch MoviePass the following year (Spangler, 2021). MoviePass officially returned on Labor Day (September 5) 2022 with a beta launch in three U.S. cities – Dallas, Chicago, and Kansas City (Hale, 2022; Reichert, 2022).

While some may scoff at the relaunch of MoviePass as a fool's errand, given the extraordinary fashion in which the enterprise had previously flamed out (Angert, 2021), the prospects of the revived firm were not necessarily as dire as one might assume. Understanding why there was cause for optimism in MoviePass 2.0, as some have called it, requires briefly revisiting the history of MoviePass 1.0.

When Stacy Spikes and Hamet Watt first devised the concept of MoviePass, they saw the service as a prime opportunity to revitalize a flagging industry ripe for disruption. In 2011, fewer movie tickets had been sold since any year on record after 1995 (Tuttle, 2011). Spikes and Watt hoped to capitalize on the moment by offering a subscription service that could appeal both to avid moviegoers looking for a savings opportunity and to those who tended not to visit theaters often but might if incentivized. For some time, Spikes and Watt's strategy appeared to gain traction (Angert, 2021). Although the rate of growth could be characterized as modest, the company was slowly but surely establishing the new theatrical movie subscription category (Angert, 2021). The 2016 hiring of Mitch Lowe, however, proved a turning point for the company (Angert, 2021).

The story of MoviePass is filled with so many eye-opening twists and turns that Home Box Office (HBO) deemed it worthy of a documentary detailing the entire saga entitled *MoviePass, MovieCrash* (Thompson, 2024). In the documentary, which aired on HBO and streamed on its associated subscription video on-demand service Max on May 29, 2024, Spikes recounted how Chris Kelly, who was an early investor in MoviePass and whom the founders in return brought on as a strategic partner, forced Lowe's hiring by giving Spikes and Watt an ultimatum. Spikes recalled "Chris [Kelly] said, 'I can't keep funding unless we make a change. And I'd like to bring in Mitch Lowe as a CEO.' He said, 'You can either go with this, or I'm out'" (Muta'Ali, 2024). Determined to maintain Kelly's involvement, Spikes acquiesced.

Lowe boasted what seemed to be an impressive resumé; chief among his accomplishments most germane to the industry was his supposedly co-founding DVD-by-mail turned subscription video on-demand streaming provider Netflix. Additionally, Watt highlighted the depressing reality of the racial dynamic at play and how Lowe's appointment could help overcome this roadblock, explaining "If you have a White male with more gray hair, that could inspire other White males with white hair to be more comfortable investing. It's a factor that we considered through the entire entrepreneurial journey" (Muta'Ali, 2024). Spikes supported this assertion, pointing out "The stats are pretty clear, especially back then. Women and minorities were only accessing 1 to 3% of all venture capital. So that's a pretty small number. And Hamet and I were seasoned entrepreneurs and had been around and had very

successful track records. There's certain stereotypes that society has of what a successful entrepreneur looks like, and we didn't look like that" (Muta'Ali, 2024). For these reasons, especially his involvement in the creation of Netflix, bringing in Lowe appeared to be a shrewd move. Only much later did those involved with MoviePass allegedly discover that Lowe was far from instrumental in the creation of Netflix. According to Muta'Ali's HBO documentary, Lowe's claims of co-founding Netflix prove dubious at best, as his primary contribution in the early days of Netflix was simply to provide the company with an abundance of physical digital versatile discs (DVDs) (2024).

Soon thereafter, Mitch Lowe brought in Ted Farnsworth, CEO of MoviePass's new primary shareholder Helios and Matheson, and together the two began to wrest control and decision-making authority from the founders (Angert, 2021; Muta'Ali, 2024). As Spikes voiced his concerns about the direction in which Lowe and Farnsworth were steering the company, which Spikes viewed as reckless, the new leadership of the organization forced the founders – Spikes and Watt – out of their own company (Angert, 2021). Lowe and Farnsworth went on to make a series of maneuvers that can be viewed, in hindsight, as misguided at best and unethical or predatory at worst (Angert, 2021). Compounding these errors was the fact that the two were often less-than-involved with the company's day-to-day operations, frequently seen instead hobnobbing with Hollywood celebrities or gallivanting in exotic vacation destinations (Muta'Ali, 2024). What ensued was a spending spree that quickly placed the company in a financial tailspin from which it simply could not recover (Muta'Ali, 2024).

In the years since MoviePass's September 2019 shuttering, several interesting developments have occurred. Mitch Lowe and Ted Farnsworth, having been accused of directing MoviePass employees to execute multiple ethically and legally dubious maneuvers in an effort to keep the company afloat (Angert, 2021), were investigated by the California Contra Costa County District Attorney's Office and forced to "pay \$400,000 in civil penalties and restitution and [refrain] from engaging in any of those allegedly illegal acts or business practices" as part of a negotiated settlement (Guerrasio, 2021). As of mid-2024, Lowe and Farnsworth were also facing "one count of securities fraud and three counts of wire fraud" brought in 2022 by the United States Department of Justice, for which the men could receive for each count prison sentences of up to twenty years if found guilty (Muta'Ali, 2024). Perhaps the most interesting development in the wake of MoviePass's demise is original MoviePass co-founder Stacy Spikes's purchasing the company's assets, including the MoviePass name and its user email list, through bankruptcy proceedings (Kirshner, 2023; Spangler, 2021).

Eager to finally bring to fruition the vision that he had had for the company, Spikes hoped to right the wrongs that occurred once he was sidelined from the venture that he and Watt had created with the ambition to revolutionize the moviegoing experience. Spikes shared "I was always inspired by stories like Steve Jobs[s], you know, leaving Apple and coming back. I was inspired by Michael Dell[s] leaving Dell Computers and [his] coming back. And there's [sic] so many stories in the entrepreneurial ethos where the founders came back. I'd never live with myself if I didn't try" (Muta'Ali, 2024). In a theatrical landscape ravaged by the effects of the global COVID-19 pandemic, conditions again seemed ripe, as they were in 2011, for a solution that could drive audiences back to theaters. With Spikes firmly back at the helm, MoviePass relaunched in beta form on September 5, 2022 (Hale, 2022; Reichert, 2022).

This time, the company would proceed more cautiously than it had when Lowe and Farnsworth were charting the course. Initially, the revamped service was offered in just three test markets – Dallas, Texas; Chicago, Illinois; and Kansas City, Missouri (Reichert, 2022). After this modest but manageable rollout, MoviePass expanded its reach nationwide ahead of Memorial Day weekend 2023 (Spangler, 2023). By May 29, 2023, over four thousand movie theaters across the United States accepted MoviePass (Spangler, 2023).

The revamped subscription service substantially contrasted with the original offering in several key respects designed to better lay the foundation for long-term success. Tickets had to be purchased using a credit-based system, in which users were granted a certain number of monthly credits commensurate with the subscription tier chosen (Spangler, 2023). Each showing of a film "cost" a set number of credits, based on factors such as day and time, with off-peak showtimes' "costing" fewer credits (Spangler, 2023; Heater, 2023). Aside from a few select markets, such as Southern California and New York City, plans were priced starting at roughly \$10 per month and increasing in \$10-dollar increments, up to a maximum of \$40 per month (Spangler, 2023). The Basic plan (\$10/month) awarded 34 monthly credits, enough to see up to three movies; the Standard plan (\$20/month) awarded 72 monthly credits, enough to see three to seven movies; the Premium plan (\$30/month) awarded 113 monthly credits, enough to see five to eleven movies; and the Pro plan (\$40/month) awarded 640 monthly credits, enough to see up to thirty movies (Spangler, 2023). Unused credits rolled over, with users able to bank up to two months' worth of credits (e.g. a Basic subscriber could store up to 68 credits, or double the 34 issued each month) (Heater, 2023). After monitoring customer usage

trends, MoviePass opted to discontinue the Pro option (\$40/month for up to 30 movies) in November 2023 (MoviePass, 2023), thus leaving the Basic (\$10/month), Standard (\$20/month), and Premium (\$30/month) plans.

The popularity of the original iteration of MoviePass spawned several competitors, chief among them similar subscription services operated by major theater chains such as AMC Theatres, Regal Cinemas, and Cinemark. It is worth noting the types of plans that each of these theatrical exhibitors offered, since these alternatives arguably constituted the most apparent threat to the rebooted MoviePass. For \$19.95-\$24.95 a month (prices ranged based on location), AMC Stubs A-List granted subscribers the ability to attend up to three film showings per week (AMC Theatres, 2024). For \$21.49-\$26.49 a month, Regal Unlimited permitted an infinite number of movies every month but required a minimum three-month commitment (Regal Cinemas, 2024). For \$10.99-\$11.99 a month, Cinemark Movie Club offered just one ticket per month, although unused tickets could be indefinitely rolled over as long as the ticketholder remained a Movie Club member (Cinemark, 2024). In addition to the main draw of a flat monthly fee in exchange for multiple movie screenings, each service also boasted concession discounts and other welcome perks. While each of these subscriptions naturally limited customers to the offering company's own theaters (e.g. AMC Stubs A-List could only be used at AMC cinemas), as of 2023, AMC, Regal, and Cinemark collectively operated the vast majority of theaters across the U.S. market (Carollo, 2024).

Alongside the new MoviePass's elimination of its 30-movie Pro tier came several upgrades to the service, including oft-requested functionality that allowed users to seamlessly purchase tickets via all online ticketing platforms, the discontinuation of physical cards in favor of a fully-virtual solution, the option to buy additional credits, access to films exhibited in premium formats, and a friend referral program (Boxoffice Staff, 2023). Thanks in part to a deal with retail giant Walmart, first announced concurrent with MoviePass's national rollout, the service gained much-needed exposure by having redeemable subscription tokens readily available for in-store purchase (Guerrasio, 2023). By February 2024, the newly reborn MoviePass boasted that the service had been used by subscribers to watch over one million films (Sherry, 2024). Even more impressive, however, was the triumphant announcement that the company had achieved profitability in its first year of offering the national MoviePass service, a claim that the original MoviePass was never able to tout in all of its years in existence (Sherry, 2024). In explaining how the company achieved this unprecedented feat, Stacy Spikes pointed to "the proprietary credit system" and "the company's AI-powered enhancements," both of which afforded advantages previously unavailable to the company in its prior iteration (Sherry, 2024). On the heels of this promising announcement, telecommunications giant Comcast pledged a major equity investment through its Forecast Labs division (Lang, 2024).

Many challenges remain for the rebooted MoviePass. Fierce competition from competitors (especially theater chains AMC, Regal, and Cinemark), continued softer ticket sales in the wake of the COVID-19 pandemic, and trends suggesting a diminished cultural relevance of movies in general all threaten the future of MoviePass (Yao, 2021). No matter how promising of a start a company boasts, the fortunes of any firm may suddenly change, be it as a result of declining customer demand, cash flow problems, or any number of other critical issues. For Spikes, though, a visionary pushed out of the groundbreaking company that he had created and forced to sit on the sidelines, helplessly watching as others irresponsibly ran his brainchild into the ground, the accomplishments of quickly reaching the milestone of one million films watched and achieving profitability within the first year, as well as the feat of securing Comcast's vote of confidence, surely brought welcome vindication. MoviePass's future may yet prove precarious, but at least early indications paint a promising picture for the rebooted company's path forward.



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## APPENDIX

Instructors may wish to pose questions regarding MoviePass's failed first foray and the company's subsequent revival. Some suggestions include:

1. What role do business leader characteristics and values play in an enterprise's success or failure? How did Lowe's and Farnsworth's characteristics and backgrounds differ from those of Spikes and Watt?<sup>a</sup>
  2. Compare and contrast the strategy employed in the latter years of MoviePass 1.0 to the strategy of MoviePass 2.0. What key strategic elements do you deem most representative of each approach?
  3. What is the value of a brand? Does a brand's value still exist once the brand has been tarnished?<sup>b</sup>
  4. Once consumer trust has been lost, can it be regained? How? Specifically, what steps would you recommend that MoviePass take to assuage the fears of past subscribers who may feel distrust – and perhaps even animosity – toward the brand?
  5. In what ways did Lowe and Farnsworth's iteration of MoviePass attempt to serve shareholders? In what ways did Lowe and Farnsworth's iteration of MoviePass do shareholders a disservice? In what ways is Spikes's iteration of MoviePass attempting to serve shareholders? In what ways is Spikes's iteration of MoviePass doing shareholders a disservice?<sup>c</sup>
  6. Can you devise entrepreneurial opportunities besides MoviePass-style services that could help movie theater operators still struggling in the post-pandemic landscape? What innovative concepts might help drive traffic back to cinemas?
  7. Do you believe that MoviePass will experience long-term success? Why or why not? How does the current environment influence your assessment of MoviePass's likelihood of success?<sup>d</sup>
  8. Do you currently, or would you in the future, subscribe to MoviePass? Why or why not? If not, what might compel you to subscribe?
- a. This question can effectively integrate into a lesson focused on the upper echelons theory perspective/lens, which illustrates how top managers' individual characteristics can influence a firm's strategy (Hambrick and Mason, 1984). For example, respondents may draw conclusions about how a change in leadership during MoviePass's first incarnation could have resulted in firm performance problems.
  - b. This question can effectively integrate into a lesson focused on the resource-based view perspective/lens, which argues that a firm's resource portfolio proves a key determinant of the likelihood of the organization's enjoying a sustainable competitive advantage (Penrose, 1959). For example, respondents may discuss the cachet, or lack thereof, remaining in the MoviePass brand and could draw upon examples of other companies that have mined nostalgia and value from previously-dormant intellectual properties.
  - c. This question can effectively integrate into a lesson focused on the agency theory perspective/lens, which addresses the conflicts that can occur between agents (i.e. managers) and principals (i.e. shareholders) of a firm (Jensen and Meckling, 1976). For example, respondents may detail the disconnect between the goals of MoviePass's owners (shareholders) and the goals of the company's leadership.
  - d. This question can effectively integrate into a lesson focused on the institutional theory perspective/lens, which examines how factors such as legitimacy-seeking behavior and isomorphism can shape a firm's strategy (DiMaggio and Powell, 1983). For example, respondents may point to competitors' offerings as both indicators of the revamped MoviePass's likelihood for success and inspiration for how MoviePass might wish to tweak its offerings to more closely align with those of others in the marketplace.

# Cultivating Career-Readiness Competencies in Marketing and International Business Curriculum

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## ABSTRACT

This study evaluates the effectiveness of a career-focused business course at a large, public AACSB-accredited institution. Survey data from enrolled students reveals that practical modules like career planning, LinkedIn workshops, and networking mentorship resonate most with students. The study provides actionable insights for designing comprehensive career development programs, emphasizing lifelong learning, adaptability, and strategic skill development. By fostering competencies aligned with workforce demands, business schools can better prepare students for an ever-changing professional landscape.

**Keywords:** career readiness, competencies, professional development, career success, lifelong learning, workforce preparation

## INTRODUCTION

In a dynamic job market, career readiness is essential for the long-term success of undergraduate business students. Career readiness refers to the foundation of core competencies that enable individual succeed in the workplace and manage their careers over a lifetime as stated by the National Association of Colleges and Employers (NACE) (2021). In higher education, career readiness provides a framework to align curricular and extracurricular activities with career-related goals across all fields of study and students depend on the universities to provide them with the fundamental skills to be able to grow their careers.

The implementation of the career readiness paradigm in higher education is necessitated by various factors. The corporate job landscape is rapidly transforming in response to technological breakthroughs. Business education must substantially change by incorporating digital literacy, hybrid skill sets, and interdisciplinary learning into curriculum to address the changing demands prompted by technological advancements, automation, and economic transformations (Bratianu, 2023). Students must gain new skills while adapting to modern job search and career development techniques, including sustaining an online presence on sites such as LinkedIn, Indeed, and ZipRecruiter, as well as participating in extracurricular activities. Career preparation skills are crucial for students to adeptly navigate their professional trajectories, as the US Labor Bureau indicates that the average worker transitions between careers 12 times during their lifetime (Kaplan, 2023). Furthermore, disparities in college and job readiness have been identified among racial and ethnic groups, underscoring the need for targeted interventions to address these gaps (Martinez et al., 2017). Therefore, both policymakers and researchers are both focused on vocational readiness.

## PREVIOUS RESEARCH

### The concept of career readiness and core career competencies

The concept of career readiness originated in a study by Merton in 1949 of the United States military, which discovered that privates who modeled their attitudes and behaviors after those of officers were more likely to be promoted than those who did not (1948). Early milestones, such as the Employability Skills Framework (McGarry, 2016) established foundational concepts linked academic knowledge to labor market skills. Career readiness evolved from its vocational roots to include transferable skill sets formalized by frameworks like the NACE Competencies (e.g., communication, critical thinking, professionalism) (Cruzvergara et al., 2018). While traditional measures of career and college readiness have primarily focused on academic achievements such as grades and test scores (Gaertner & McClarty,

2015), recent research has highlighted the importance of non-academic skills such as self-efficacy, resilience, and career self-efficacy in preparing students for college and career success (Lau et al., 2019; Liao & Ji, 2015). In the United States, college and career readiness refers to a multifaceted concept that includes a variety of academic and non-academic skills required for students' successful transition into postsecondary education and the workforce.

The demand from the labor market and workforce in the United States and the human capital trends in the global economy require highly educated and trained workers (Carnevale, Jayasundera, & Gulish, 2016). This emphasizes the importance of effectively teaching critical thinking and analytical reasoning skills, teamwork skills, information literacy, ethical judgment, decision-making skills, fluency in speaking and writing, problem-solving abilities, and a broad knowledge of liberal arts and sciences (ACT, 2012; An & Taylor, 2015). According to Conley (2012), College and Career Readiness (CCR) combines cognitive and noncognitive domains into four broad dimensions: key cognitive strategies, key content knowledge, key learning skills and techniques, and key transition knowledge and skills. Key cognitive strategies are intellectual behaviors required for college-level work (such as problem solving, research, interpretation, and communication). Key content knowledge includes the structure and fundamental content of core subjects, as well as technical knowledge and skills relevant to specific career fields. Key learning skills and techniques include learning ownership (e.g., goal setting, self-efficacy) as well as learning techniques. Finally, key transition knowledge and skills include information that students require to successfully transition (for example, college costs, majors, and career options). Based on nearly a decade-long, large-scale, systematic research project involving colleges and universities and industry partners, NACE defines career readiness as a foundation from which to demonstrate requisite core competencies that broadly prepare the college educated for success in the workplace and lifelong career management (Senter, 2019, NACE, 2021; 2022, Royer & Mcatee, 2021). These eight competencies are: Career and self-development, communication, critical thinking, equity and inclusion, leadership, professionalism, teamwork, and technology (Figure 1). Additionally, institutions rely on NACE's career-ready competencies to understand the nationwide job outlook and labor market trends (Dolechek & Lehenbauer, 2022). Studies have also shown a relationship between career guidance and job readiness, emphasizing the importance of work competency in preparing students for employment (Zainuddin & Rijal, 2022). Overall, these competencies play a crucial role in preparing college graduates for the demands of the workplace and are essential for their successful transition into their careers.

**Figure 1. NACE Career Competencies**

Critical Thinking	Leadership
Communication	Professionalism
Teamwork	Career & Self Development
Technology	Equity & Inclusion

### **Career paths development in Cal Poly Pomona**

California State Polytechnic University, Pomona, is a Hispanic-serving institution whose student body makeup is 45.57% Hispanic or Latino. At least 25% of the student body must be comprised of this group to be categorized as a Hispanic-serving institution according to online.com (Nichols, 2022). Given this statistic, the university has earned accolades and recognition on a national level. The university is ranked number 3 in social mobility (CollegeNet Buzz, 2024) on the 2023 Social Mobility Index (SMI) as “the nation’s highest-ranking polytechnic university for helping low-income students achieve their dreams of success and upward economic opportunity by graduating them into well-paying careers.” Despite the successes the university has experienced in teaching its students, there remain challenges that must be consistently attended to for the university to maintain its prominent national standing in this arena.

There are signs that there are job opportunities available to the most recent spring graduates. According to NBC News (McCorvey, 2023), “Businesses planned to hire 4% more graduates from the class of 2023 than from the class of 2022.” According to the Washington Post (Bhattarai, 2023), the latest unemployment rate for recent graduates is 4.4%, which is higher than the general population as of November 2023. That news is unfortunate, but it also shines the light on the fact that it is paramount that college students need to be prepared so that they are ready when the moment arises for a good job opportunity. As for graduates of business, the average salary of an individual with a bachelor’s degree

was \$60,695 a year in 2022 (NACE Salary Survey, 2022). In the end, Cal Poly Pomona must continue to lay the groundwork for their students to be successful at providing the market with equipped young professionals.

Under the leadership of the Office of Academic Innovation (Cal Poly Pomona), a career-readiness model has been developed to address the University's Strategic Plan initiative on students' future career paths (Cal Poly Pomona). The university Career & Professional Readiness Model™ identified four distinct stages of students' career development: 1) career exploration, 2) career engagement, 3) career attainment, 4) career advancement. Continuously developing career competencies throughout the four stages resonates with NACE's Career Readiness concept as a foundation for life-long career management.

### **Embedding career readiness training in the undergraduate business curriculum**

The department of International Business & Marketing is one of the six functional areas in the College of Business Administration. The department has long established a 2-unit career-focused course—IBM 2000—for its international business and marketing majors. The initial purpose of the course is to offer the opportunity for students to interact and engage with faculty advisors in the International Business and Marketing Department in various capacities. Whereas students may feel intimidated in speaking with faculty, IBM 2000 provides a conduit where students can interact with faculty with varied backgrounds in a class setting. Overall, the goal of the course is to motivate students to identify the right career options and to prepare themselves to increase the odds of them attaining employment and establishing a career path in the field of marketing management and international business. In the past, two adjunct professors taught the course. After the university transitioned from the quarter system to the semester system school term, the department decided that a more sizable representation of permanent and adjunct faculty was needed to instruct the course to produce more impact.

Students typically take this course in their second semester of sophomore or first semester of junior year. The concepts introduced to these students at this point in the curriculum are essential for these students at this stage. To help ensure that international business and marketing students take this class earlier in their course curriculum than later, IBM 2000 is designated as a prerequisite course for a lower-level core course in the International Business and Marketing curriculum. For those students who take the course during or after their third year, the information learned in the course may be redundant since those students will be nearing graduation. Thus, the information offered in the course may be already familiar to upperclassmen. For example, upperclassmen students should likely know the significance of the career center in helping them find employment, the importance of getting an internship, or the benefits of joining a student club and networking on their own. In recent terms, two primary goals of IBM 2000 are: 1) to provide enrolled students with information to help them decide which career track or path to choose in international business or marketing, and 2) to fortify students with the competencies and resources to secure employment with the hopes of establishing a career path in their major fields of study. Major modules of the course include the following.

#### **Career Exploration**

In one class module, the primary career center counselor speaks to the class about placement services and resume building. This is coupled with the students being assigned to complete a RIASEC Assessment to find out student interests and skills (Holland, 1959). Some students have an idea of what they would like to do while others do not. Filling out this survey serves as a guide for the students to identify their strengths that apply to the business world. Career Engagement: In one class module, the faculty have an opportunity to share their personal career development journeys with the students. It is highlighted to the students that each person's journey may be different. The faculty want the students to realize that it is fine not to know which career direction they should pursue. That is the reason why students are exposed to the various departmental majors in this class. Some faculty highlight the fields that there is a high demand for. Other faculty emphasize the importance of exploring internships so that students can get a feel for a career in various occupations. Career Attainment: The university Career Center offers the following platforms for students to take advantage of to seek employment. The Center hosts employers that do a virtual drop for students to interact with businesses seeking employment. Also, class time has been set aside for companies/employers to introduce themselves to the students in the class. These companies are usually seeking interns in this case. The Career Center also hosts career fairs in person and virtually. Career Advancement: A guest speaker from LinkedIn speaks and shares with the students how to increase the size of their network. Students are shown exemplary student and former student profiles on LinkedIn as well as given strategies to enhance their profile page to attract potential employers. Guest speakers conduct workshops on etiquette and forming an elevator speech and have also been offered to help the students develop skills in different arenas. Final Project: The final project is to interview a person in a job role that the student has an interest in pursuing as a career. This task helps students do research to have a better

understanding of the responsibilities related to the job position. This experience can be eye-opening for the students, with some even deciding to change career paths after becoming more informed about the prospective position. Some students have even been hired by their interviewees, so the selection made by a student as it pertains to who they decide to interview can be a pivotal one.

## RESEARCH DESIGN

An online survey was conducted to assess student experiences of a business core course designed to improve career readiness during the Fall 2023 academic semester. A total of 192 students across five sections were invited to participate in an exit survey administered via the Qualtrics platform to which N=72 responded.

**Procedure:** Procedures applied in this study were designed according to APA ethical standards. The survey was conducted over two weeks, concluding on December 15, 2023. At the survey's outset, participants were asked to provide their name, university ID number, and section number to receive 3% of the course grade as extra credit. Students were informed that their instructors would not have access to their individual responses, which would be analyzed in aggregate for course improvement purposes. Non-participation in the survey did not affect students' grades.

**Data Collection & Measures:** The questionnaire is divided into two parts. In the first part participants rated eight course modules on a five-point Likert scale (1 = not helpful at all, 5 = extremely helpful) and in the second section, they rated the importance of each of the career competencies identified by NACE on a five-point Likert scale (1=not important, 5=extremely important). Students were also asked to select the competency to focus on in the course in the future.

**Data Analysis:** Missing data was replaced by means and the percentage of missing data did not exceed 10%. Item analysis and the analysis of means were performed using the Statistical Package for Social Sciences, Version 29.0 (2023).

## RESULTS

As Table 1 shows, five modules received ratings of helpful to extremely helpful from at least 90% of respondents: Career Track Talks (94.4%, M = 3.9, SD=.96), Career Center Resources (91.7%, M = 3.7, SD=.96), LinkedIn Workshop (91.7%, M = 4.2, SD=1.05), Career Planning Workshop (90.3%, M = 3.9, SD=.99), and Mentors and Networking Workshop (90.3%, M = 3.8, SD=.95). The remaining modules—Meeting with Instructor, Leveraging AI & Digital Job Search, and CBA Student Club Presentations—were rated as helpful to extremely helpful by 87.5% (M = 3.7, SD1.05), 86.1% (M = 3.7, SD=1.01), and 75% (M = 3.6, SD=1.20) of respondents, respectively.

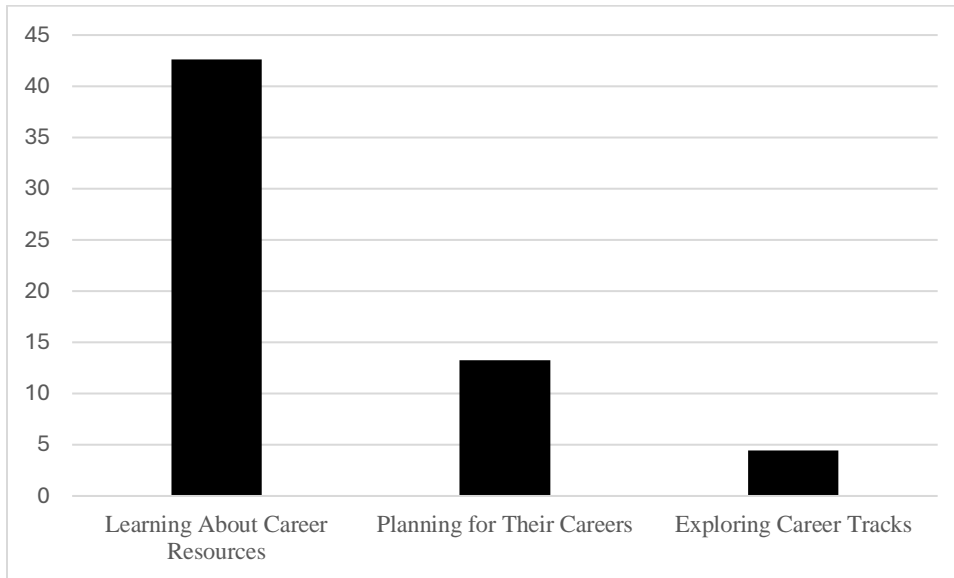
**Table 1. Perceived helpfulness of course modules in IBM 2000.**

<b>COURSE MODULE</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<i>Std Deviation</i>
<b>Career Track Talks</b>	1	5	3.9	0.98
<b>Career Center Resources</b>	1	5	3.74	0.96
<b>LinkedIn Workshop</b>	1	5	4.15	1.05
<b>Career Planning Workshop</b>	1	5	3.88	0.99
<b>Mentors and Networking Workshop</b>	1	5	3.82	0.95
<b>Meeting with Instructor</b>	1	5	3.69	1.05
<b>Leveraging AI and Digital Job Search Seminar</b>	1	5	3.69	1.02
<b>Student Club Presentations</b>	1	5	3.58	1.2

Students were asked to identify the most important knowledge gained from the course. Responses from 65 participants were categorized into three themes: learning about career resources (42.65%), planning for their careers (13.24%), and exploring career tracks (4.41%) (Figure 2). LinkedIn-related lessons were the most frequently

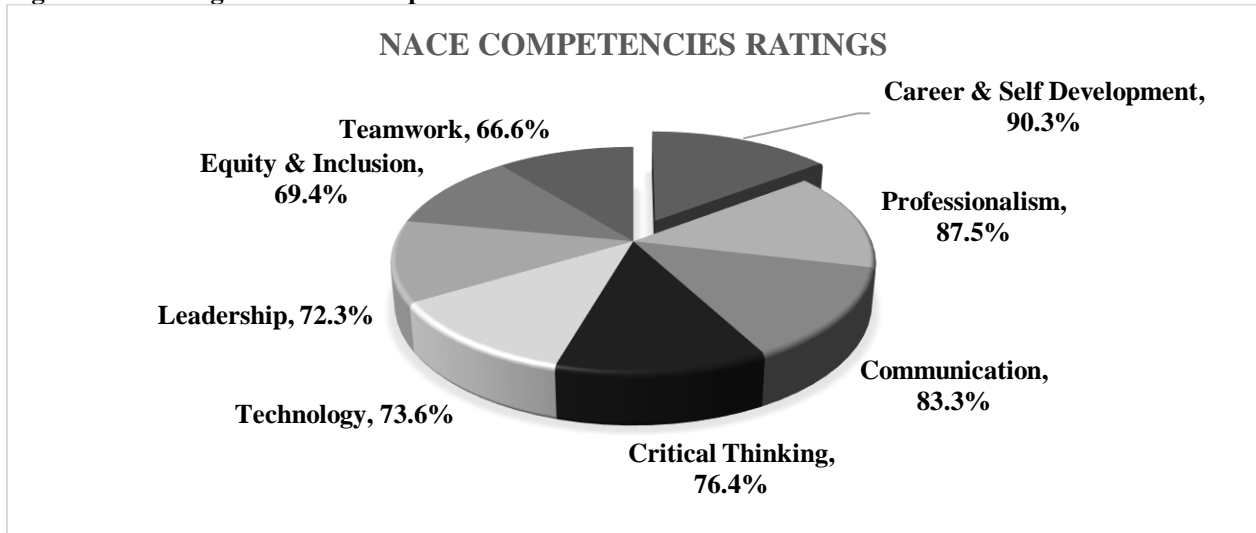
mentioned, highlighting its perceived importance for career readiness, with 32 students citing LinkedIn as “essential for career growth.”

**Figure 2. Percent Frequency of Key Themes in Most Important Lesson Learned**



Finally, students were requested to identify as many NACE competencies as possible that would guide the curriculum for the upcoming semesters, thereby revealing which competency they believed the class could most effectively address. Figure 3 shows the percentage distribution of the responses across the competencies.

**Figure 3 Percentage of NACE Competencies Students Recommended the Course to Focus on in the Future**



## DISCUSSION

This study offers insights into how the current career course embedded in the marketing and international business curriculum is helping students develop the essential career skills and prepare them to be career ready. The findings from this study underscore the effectiveness of embedding career readiness into the undergraduate business curriculum. Students overwhelmingly rated specific course modules, such as LinkedIn workshops, Career Track

Talks, and networking mentorship, as highly beneficial. These modules addressed practical aspects of career development, aligning with NACE competencies such as communication, professionalism, and career and self-development. The prominence of LinkedIn-related lessons in student feedback reflects the growing importance of digital networking and online career management tools in preparing students for the workforce.

The thematic analysis revealed that the majority of students valued learning about career resources, which accounted for 42.65% of the responses. This focus highlights the necessity of equipping students with the knowledge and tools to access institutional and professional resources. The smaller, yet significant, emphasis on career planning (13.24%) and exploring career tracks (4.41%) points to the importance of tailored guidance in helping students align their academic trajectories with their professional aspirations.

Students also identified NACE competencies such as career and self-development, professionalism, and communication as critical areas for future course development. These findings suggest that a strategic focus on these competencies can enhance the relevance and impact of career readiness programs, ultimately bridging the gap between academic preparation and workforce demands.

## CONCLUSION

This study illustrates the essential function of career-oriented courses in cultivating vital competencies that equip students for a changing work market. Integrating career readiness-oriented courses into the business curriculum effectively helps students' perception of career readiness. By emphasizing practical skills, such as digital networking, resume building, exploring extracurricular activities and professional communication, such a course can help students direct their career efforts in a way that helps them become lifelong learners. The results of this study therefore highlight the need for business schools to prioritize modules that resonates with students and job environments, particularly those addressing digital tool and networking opportunities.

Future studies and iterations of this course should integrate focused interventions to improve career planning and track exploration, so assuring a more holistic approach to career readiness. Furthermore, connecting course content with competencies in high demand as recognized by students might enhance the program's effectiveness. The incorporation of career preparedness into the business curriculum prepares students with essential skills while emphasizing adaptation and lifelong learning as fundamental tenets for career success.

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# 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
  - Description and use of new cases or material
  - Lecture notes, particularly new and emerging topics not covered effectively in textbooks
  - Innovative class activities and action-learning – games, active learning, problem based
- Major or emphasis area program design that is new or innovative.
- Assessment – all aspects including AACSB and university level assessment strategies and programs
- Integration of programs or courses with other academic disciplines
- Internship programs
- Business partnerships
- Successful student job placement strategies
- Any topic that relates to higher education business education.

## SUBMISSION AND REVIEW PROCESS:

### Copyright

- Manuscripts submitted for publication should be original contributions and should not be under consideration with another journal.
- Authors submitting a manuscript for publication warrant that the work is not an infringement of any existing copyright, infringement of proprietary right, invasion of privacy, or libel and will indemnify, defend, and hold Elm Street Press harmless from any damages, expenses, and costs against any breach of such warranty.

### Prepare your manuscript

- See the Style Guideline page for specific instructions.
- Articles must make a contribution to business education innovation.
- Manuscripts can be any length. The first 10 pages are charged the current per page rate, and pages over 10 are charged half that rate.
- Articles can be either regular research papers, or shorter notes that succinctly describe innovative classroom teaching methods or activities.
- Manuscripts should be completely finished documents ready for publication if accepted.
- Manuscripts must be in standard acceptable English grammatical construction.
- Manuscripts should be in MS Office Word format. Word 2007 files are acceptable, as are earlier versions of Word. If you are using a new version of Word after Word 2007, save in Word 2007 format.

### Submit your manuscript

- Manuscripts may not have been published previously or be under review with another journal.
- Submit the manuscript attached to an email to **submit@beijournal.com**
- We will respond that we have received the manuscript.
- Article submissions can be made at any time.
- Submission deadlines: September 15 for December issue, March 15 for June issue.

### **Manuscript review**

- The editor and reviewers will review your submission to determine if 1) the content makes a contribution to innovative business education, 2) is of the proper page length, 3) is written in proper grammatical English, and 4) is formatted ready for publication.
- Submissions not meeting any of these standards will be returned. You are invited to make revisions and resubmit.
- If the submission meets the standards, the manuscript will be sent to two reviewers who will read, evaluate and comment on your submission.
- The editor will evaluate the reviews and make the final decision. There are 3 possible outcomes:
  - Accept as is.
  - Accept with minor revisions.
  - Not accepted.
- Reviews will be returned promptly. Our commitment is to have a decision to you in less than two months.
- If your paper is not accepted, the evaluation may contain comments from reviewers. You are invited to rewrite and submit again.

### **If your paper is accepted**

- Minor revision suggestions will be transmitted back to you.
- Revise and send back as quickly as possible to meet printer deadlines.
- Upon final acceptance, we will bill you publication fees. See [www.beijournal.com](http://www.beijournal.com) for latest per page fees. Sole author fees are discounted.
- The fees include all costs of mailing a copy of the issue to each author via standard postal ground.
- Delivery to locations outside the continental US will cost an additional \$10 per author for 5 day delivery.
- Faster delivery methods are available for US and international delivery. Contact the editor for a specific pricing.
- All publication fees should be remitted within 10 business days of acceptance, if possible.
- If you decide not to publish your paper with BEI Journal after submitting payment, we will refund publication fees less \$200 to cover costs of review and processing.
- Cancellation cannot occur after the paper has been formatted into the final printer's file.

# Manuscript Style Guide and Example

An example is provided following these instructions.

This style guide represents style guidelines in effect for future issues, but always check for updates online.

Authors are responsible for checking for correct grammar, construction and spelling. Authors are also responsible for formatting pictures, tables, and figures such that a pdf black and white file sent to the publisher will reproduce in a readable manner.

## General Setup:

- All fonts other than exceptions noted below: Times New Roman. 10 point for text. Other sizes as noted below
- Margins: 1 inch on all sides of 8½x11 inch paper size.
- No headers or footers, other than page numbers centered lower.
- 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, 1 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 (14 pt bold)**

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...

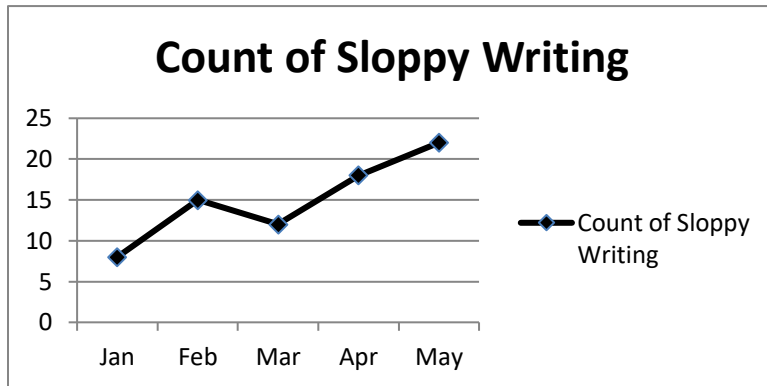
**Data Analysis**(Sub-heading, bold but not all caps, 10 point, aligned left, bold, no line after to paragraph)

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 (10 pt bold, 1 line after to table, left justify)**



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)**

	<b>Good Thinking</b>	<b>Sloppy Thinking</b>
<b>Good Writing</b>	5	22
<b>Sloppy Writing</b>	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 (title 10 point, all caps, bold, align left, one line to first reference)

**(1 line spacing)** (All references 8 point, indent second line 0.25 inch)

- 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)

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