

Using Emerging Technologies in the Introductory Managerial Accounting Course to Increase Interest in the Accounting Major and Technology Competencies

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Abstract

Universities nationwide are experiencing declines in accounting majors despite the financial security and job opportunities available in the profession. This study investigates the impact of integrating technology-based activities into accounting curriculums as a potential solution to this decline. Specifically, the research examines the implementation of the Cuddly Stuffed Animals – Join case, which integrates Power BI software into an introductory managerial accounting course (n=343 survey respondents). Guided by two hypotheses that early exposure to data analytics enhances students' understanding of ETL (Extract, Transform, Load) concepts and increases interest in accounting as a major, the study evaluates student perceptions of both the educational value and motivational impact of the case. Results indicate that students perceive the inclusion of data analytics as beneficial for understanding how to convert data into information and for stimulating interest in accounting. However, the evidence of a direct influence on students' intent to select accounting as a major was modest and based on self-reported perceptions. These findings suggest that incorporating technology early in the curriculum enhances engagement and technical understanding, with a limited yet positive influence on career interest. These insights are valuable for curriculum design in both introductory and advanced accounting courses.

Introduction

Universities nationwide are experiencing declines in accounting majors despite the financial security and plethora of job opportunities available in the profession. A lack of pedagogical approaches that spur student interest in the profession has been suggested as a reason for this decline. Simply put, merely engaging students in traditional lecture formats absent hands-on teaching applications of how business operations associate with accounting often prove problematic. This hypothesis is additionally supported by recent changes to the CPA exam and AACSB Standard A5, which emphasize the profession's growing expectation for technological proficiency.

Active learning, particularly when it incorporates technology, has been shown to promote independent thinking and problem-solving and to enhance student engagement. Moreover, the role of technology in accounting is receiving considerable attention from both the academic and professional communities. For example, data analytics has

become increasingly important to the accounting profession and is now a part of the CPA exam curriculum. The Association to Advance Collegiate Schools of Business (AACSB) International has also set a specific standard (Standard A5) requiring accredited accounting departments to adopt curriculums that increase knowledge about information technology. While prior research has established that active learning and real-world applications can improve student engagement and perceptions of accounting, little is known about whether early exposure to technology in introductory accounting courses can influence students' decisions to pursue accounting as a major. This study aims to fill this gap by examining whether a technology-based, hands-on case can simultaneously improve students' technical understanding and motivate interest in the profession.

Additionally, involving technology also provides an opportunity to assess accounting education from the standpoint of perceived usefulness, which measures the extent new concepts being taught are perceived as adding value to current and/or future academic and/or professional pursuits. For example, if, via exposure to a new technology, a student perceives he/she now has a skill set that can be employed to create a competitive advantage, perceived usefulness can be described as positive. In the accounting/technology link, one aspect of perceived usefulness is how the introduction of and training in technology can help provide a better understanding of the role accounting plays in business.

This research article studies the implementation of *Cuddly Stuffed Animals – Join*, a case that integrates Power BI software into the introductory managerial accounting course.

The study is guided by two hypotheses

1. Integrating data analytics through a hands-on, technology-based case in an introductory managerial accounting course enhances students' understanding of ETL (Extract, Transform, Load) concepts.
2. Integrating data analytics through a hands-on, technology-based case in an introductory managerial accounting course positively influences students' interest in pursuing accounting as a major.

These hypotheses reflect the profession's increasing emphasis on technological competencies and address the urgent need to reinvigorate student interest in accounting education by aligning classroom experiences with contemporary business practices.

Literature Review

Internationally, similar trends have been reported (e.g., Larres & Joyce, 2024), reflecting a broader global shift toward analytics-focused accounting education. This study builds on prior work by specifically examining whether hands-on exposure to technology in early coursework can influence students' decisions to major in accounting. The integration of Power BI also serves to counteract student concerns regarding accounting's perceived difficulty and limited relevance, which are common deterrents.

Universities have witnessed a major decline in accounting majors across the United States. The Association of International Certified Professional Accountants (AICPA) 2021 Trends Report showed an 8.7% decrease in accounting baccalaureate degrees from 57,482 in 2012 to 52,481 in 2020. Current research offers some insight as to why the number of accounting majors has diminished. Kolar (2022) observed students balk at choosing accounting as an academic major because of increased time in school (i.e., the 150-hour format), the cost of accounting education, a high workload, low starting salaries, competition from more attractive and engaging jobs, and a wide range of unflattering perceptions of the profession.

Albrecht and Sack's (2000) report entitled, "Accounting Education: Charting the course through a perilous future" researched the decline in accounting majors and recommended avenues for accounting education to address. The committee, made up of leaders in accounting education and accountants in practice, firmly stated accounting education needed significant change and suggested accounting departments take deep dives into existing course content to assess how it is being taught, asking specifically, "Do the delivery methods rely too much on lecture and

memorization?” (Russell et al., 2000, p. 11). Freeman (2018), in alignment with Albrecht and Sacks (2002), indicated the traditional lecture format remains the most used pedagogical method in the accounting classroom even though it does not fully engage or motivate students to learn.

Professors can use the classroom environment to obtain student-held perceptions about the profession and one way to do so is by using active learning, a pedagogy that guides students to become more engaged in self-directed problem solving. Active learning is especially relevant when it is adopted to expose students to new or unfamiliar topics (Gioiosa and Kinkela 2019). Adopting active learning has also been found to increase an understanding of and interest in accounting (Coram 2005) and could act to increase the selection of accounting as a major (Bak 2017).

Course Content: How the introductory accounting courses influence accounting major enrollment

In 2012, the American Institute of Certified Public Accountants and the American Accounting Association created the Pathways Commission to research the following:

future of higher education . . . and [to develop] recommendations for education pathways to engage and retain the strongest possible community of students, academics, practitioners and other knowledgeable leaders in the practice and study of accounting and to investigate ways to enhance the opportunities and relevance of the accounting education experience in its broadest sense. (Pathways Commission, p. 9)

They made several recommendations to move accounting education in the right direction. *Recommendation 5* of their report was to “Improve the ability to attract high-potential, diverse entrants into the profession” (Pathways Commission, 2012, p 81). A portion of this recommendation stated the importance of enhancing perceptions of the study of accounting and transforming the first course in accounting. They stated that the first course in accounting:

serves as the single most important factor in deciding whether to pursue the study of accounting. Labeling this course as a fork in the road for attracting diverse high-potential students does not overstate the importance of this course [and] without . . . engaging learning approaches, this course may negatively influence students. (Pathways Commission, 2012, p. 86-87).

Existing research has reiterated the importance of the introductory accounting course in recruiting accounting majors. For example, AECC (1992) discussed the importance of the very first accounting course relative to changing the perception of the accounting profession, assessing the skills required for the profession, and highlighting the career opportunities available. In addition, Mauldin (2000) found accounting principles instructors are crucial to recruiting accounting majors as this course is where most students choose to major in accounting.

Given the role introductory accounting courses play in exposing students to accounting, and how these courses can be used to address student perceptions about the profession, an important question to address is: what could be adopted in these courses to reduce the disconnect between accounting course pedagogy and the selection of accounting as a major? Evidence indicates adopting innovative ways to engage students in the introductory accounting classrooms appears to have a positive impact on increasing accounting major enrollment. Maas (2013), for instance, implemented new ideas into the first accounting principles class and saw an increase in accounting majors. Similarly, Abbot and Palatnik (2017) examined the importance of linking introductory accounting to the ‘real world’ by supplementing traditional coursework with projects that connect accounting to other elements of business. The authors found that introductory accounting activities that engage students are much more likely to have a positive impact on the decision to choose accounting as a major. More evidence indicates that integrating technology into the curriculum enhances engagement and better prepares students for industry demands (Lawson et al., 2023). Other studies show that leveraging innovative teaching strategies, such as real-world applications of technology, can significantly impact students' decision to pursue accounting as a major (Murthy, 2024).

Importance of information technology in the accounting curriculum

The Pathways Commission (2012) highly recommended the first accounting courses utilize technology. Specifically, when describing why certain engaging materials are needed, action item 5.2.2 states “to capture the interest of high-potential students and recruit them into the accounting profession, significant efforts should be undertaken to provide materials that promote project-based learning and take advantage of technology” (p. 87-88). In association, Albrecht and Sack (2000) suggested including globalization, technology, and ethics in the classroom, and changing pedagogical methods to include more active learning methods with an increased focus on technology would prove beneficial. The integration of emerging technologies in accounting curricula aligns with AACSB's Standard A5, emphasizing the adaptation to both current and new technologies (Blocher et al., 2024) and (Larres & Joyce, 2024).

Technology is gaining traction in accounting as evidenced by its mention in the AACSB standards for accreditation, its inclusion in the new CPA exam format, and increased references to it in accounting job listings. AACSB's goal in accounting accreditation is to recognize accounting programs that produce excellent graduates and provide an academic atmosphere of scholarship and engagement. As a part of their accreditation standards, Standard A5 states as follows:

Standard A5: Consistent with mission, expected outcomes, and supporting strategies, accounting degree programs include learning experiences that develop skills and knowledge related to the integration of information technology in accounting and business. This includes the ability of both faculty and students to adapt to emerging technologies as well as the mastery of current technology (AACSB, 2021).

The AICPA has also fully incorporated emerging technologies and data analytics into the new CPA exam that was launched in January 2024. Under this new approach, data analytics will be a part of each of the core sections, and one of the specific sections will focus on analytics. Consequently, to perform successfully on the CPA examination, accounting majors must now develop a high degree of proficiency with emerging technologies.

Additionally, there is an increased inclusion of technologies in accounting job listings. Larson (2021) studied job listings to see skills desired by those employers looking for CPA's. Larson's research findings showed the need for the following skills: 80% report-writing/generation, 38% system analysis and design, 14% enterprise systems knowledge, 13% knowledge in databases. Another 87% required general data analytics skills and 89% of those were in entry-level positions. Recent research demonstrates the importance of digital competencies in accounting education, highlighting the need for students to gain skills in data analytics, information systems, and emerging technologies (Ellis et al., 2023). Larson's (2021) study also found that “IS knowledge, analytics ability, and soft skills are widely required even for entry-level accounting positions, suggesting that it is essential to expand the opportunities for accounting students to gain knowledge and experience in these areas” (p. 33).

Although the literature offers substantial support for the integration of technology into accounting education particularly with respect to enhancing learning outcomes and aligning with professional competencies there remains a relative scarcity of research on related issues. In particular, limited attention has been given to how early exposure to these technologies may influence students' decisions to select accounting as their major. Most studies focus on skill development or curriculum alignment with industry standards, but few directly explore the potential of technology-enhanced pedagogy as a tool for addressing the decline in accounting majors. This study seeks to fill that gap by investigating whether a data analytics-based case in an introductory managerial accounting course can not only improve student understanding of ETL processes, but also motivate greater interest in the accounting profession at a critical decision-making stage in students' academic careers.

The Cuddly Stuffed Animals-Join Case: Experience with Power BI and ETL

The Role of Technology in Accounting Case Studies

Case studies are useful to gather perceptions students hold about course content and the benefits of engaging with that content (Weil et al 2004, Hassel et al 1998, Weil et al 2001, Libby 1991, Ballentine and Larres 2004, and Montano, Cardoso and Joyce 2004). Libby (1991) modeled the student benefits of using a case study as: (1) *affective* which capture perceptions about motivation, interest in material, and the development of confidence; and (2)

cognitive which capture perceptions about how interacting with a case lead to the development of problem solving, judgment, and comprehension skills. Montano, Cardoso, and Joyce (2004) expanded the review of case materials in accounting and found cases often spur interest in course content and subject matter.

This study utilized the CyberText Cuddly Stuffed Animals – Join case for Power BI. Initially, students independently completed a mini tutorial provided by CyberText. The tutorial included: (1) a 36-minute tutorial video; (2) a 62-page pdf instruction manual, and (3) five Excel data files housed in the Stuffed Animals Join.Demo.xlsx datafile¹.

The mini-tutorial and case study were used to incorporate Power BI software in the introductory managerial accounting curriculum, thereby introducing students to the process. The ETL process involves three steps: (1) Extracting data from multiple sources like EXCEL and loading it into data warehouse; (2) Transforming the data by cleaning it up and possibly restructuring the components and doing calculations, as required; and (3) Loading the data into a chosen software where it can be used for decision making and data visualization. Tietz et al noted the ETL is important for introductory accounting students as they need to understand that, in the real world, data are rarely clean. Qasim et al (2020) also suggested ETL instruction is “best fit” at this level because it (1) provides a foundation to demonstrate why data analytics is important in today’s business and accounting environment, (2) demonstrates how data analytics tools can be used in accounting, and (3) creates a capacity to identify and compare the benefits of alternative technology tools.

Upon completing the tutorial, students downloaded their unique algorithmically generated and self-grading case from CyberText. Utilizing the knowledge acquired through the mini-tutorial, students extracted data files (see Exhibits 1-5), transformed the data into two reports (see Exhibits 6-7), and answered ten analytical questions. Students then uploaded their solutions to CyberText, where they received unlimited and immediate feedback.

Research Methodology

Aim of research

The purpose of this study is to evaluate the implementation of the *Cuddly Stuffed Animals – Join* case to assess the extent to which it increased their understanding of ETL and enhanced the development of skills deemed important when using data analytics to produce and integrate accounting-related business data in decision making. This evaluation is based on the hypothesis that early exposure to data analytics in accounting courses contributes to both technical skill development and heightened interest in accounting as a career path. In particular, we sought to examine whether hands-on engagement with a real-world technology tool—Power BI—has a meaningful impact on students' perceptions of accounting and its relevance to modern business environments.²

Background of the study

Between Fall 2022 and Spring 2023, the *Cuddly Stuffed Animals – Join* case was included as a required component of the introductory managerial accounting at a medium-sized university located in the southeastern part of the United States. The course was coordinated and included a shared syllabus. From a study standpoint, this created a common student learning experience and reduced instructor bias and differences in course content.

Questionnaire design

The questionnaire, based on the framework provided by Murthy (2010), was developed to gain insight about the perceptions students have about the role of technology in accounting, the benefits it contributes to the learning

¹ See Appendix A for the materials involved and deliverables associated with the case.

² When examining the impacts of technology instruction, an important perception to evaluate is the extent individuals exposed to that technology attach a sense of “perceived usefulness” to their exposure. Davis (1989), for example, defined this as the extent a perceived positive and comparative advantage emerges because of exposure. Damerlia and Salimi (2021) examined perceived usefulness in an accounting education setting and found useful in curriculum development. Given this input, we conduct our analysis in as similar fashion.

experience, and the link, if any, it creates in motivating interest in pursuing accounting as an academic major. All students enrolled in the course during the study period (N = 942) were invited to participate in the post-case survey, which was voluntary and administered anonymously. No incentives were offered for participation. A total of 343 completed surveys were received, yielding a response rate of 36%. The research was approved by the university's Institutional Review Board. No demographic information (such as students' year of study, major, or prior experience with technology) was collected, which we acknowledge as a limitation of the study.

Three sections were created to capture perceptions of usefulness using a 5-point Likert scale where: Strongly Agree = 1; Agree = 2; Neither Agree Nor Disagree = 3; Disagree = 4; and Strongly Disagree = 5. The sections and the questions asked in each section are as follows:

Section I

Two questions explore student perceptions about how the ETL process helps to define **(DEFINE)** the role of data analytics in accounting.

Q1: The case was effective in terms of illustrating the power of ETL data analytics techniques in accounting.

Q10: The Cuddly Stuffed Animals – Join case provided me with a useful example of the application of ETL software in accounting.

Section II

Four questions explore student perceptions about how the use of ETL added knowledge **(BENEFIT)** about and created confidence in the use of tasks related to planning, organizing, directing, and controlling the accounting information development process.

Q4: After completing the Cuddly Stuffed Animals - Join case on cleaning and transforming data, I feel I understand how ETL data analytics techniques can be used to redundantly prepare data for analysis.

Q5: The Cuddly Stuffed Animals – Join case was effective in teaching me how to manipulate multiple data sets into a flat file which can then be easily analyzed.

Q6: The Cuddly Stuffed Animals - Join case increased my knowledge and understanding of the importance of ETL data analytics techniques for the proactive analytic review of data.

Q7: I am confident in my ability to use the ETL data analytics techniques in the future to manipulate data sets into a flat file which can then be easily analyzed.

Section III

Two questions explore how the introduction and use of the ETL process affect **(IMPACT)** student perceptions about the accounting curriculum and increased an interest in the accounting profession.

Q1: The Cuddly Stuffed Animals – Join case should continue to be used in the future in this course offering.

Q10: After completing the Cuddly Stuffed Animals – Join case on cleaning and transforming data, I am more inclined to consider accounting as a major.

Data Analysis

A total of 942 cases were graded and 343 complete surveys were received, which reflects a 36% response rate. Two stages of analysis were undertaken.

In the first stage, we summarized the distribution of responses across the Likert-scale items for the full sample of respondents. Table 1 presents counts and percentages for each response category (Strongly Agree to Strongly Disagree) for all survey questions.

Results from the full sample indicate strong support for the inclusion of data analytics in the course. For example, regarding the EFFECT dimension (Q1), 78% of respondents at least agreed that the case effectively illustrated the power of ETL data analytics in accounting. Similarly, on the APPLY dimension (Q10), 72% agreed or strongly agreed that the case provided a useful example of ETL application.

A review of perceived usefulness or **BENEFIT** found similar observations. Specifically, across a series of questions (Q4, Q5, Q6, and Q7) designed to assess the extent respondents valued the skills gained via exposure to the data analytic exercise, most of the respondents indicated perceived usefulness of the technology and the ensuing development of skills obtained after associating with the case. For example, 67% (228) of the respondents at least agreed they gained a more informed understanding of how data analytics can be used in accounting to address redundant tasks. Moreover, 74% (254) and 75% (257) of these respondents observed similar patterns of usefulness relative to gaining an understanding about how to manage multiple data sets for analysis, and how to use data analytics as a part of proactive analytical reviews of data. Finally, 57% (194) of the respondents at least agreed that after being exposed to the case, they had confidence in their ability to apply data analytics to manipulate data sets for easy analysis.

Regarding the IMPACT dimension, perceptions were more moderate. Approximately 48% (162) agreed that the case should continue to be used in future course offerings, and 24% (82) indicated that they were more inclined to consider accounting as a major after completing the case.

In the second stage of analysis, we descriptively examined responses from two subgroups: students who at least agreed with the EFFECT statement (n=268) and those who at least agreed with the APPLY statement (n=248). These subgroups demonstrated stronger positive perceptions on both BENEFIT and IMPACT dimensions compared to the full sample. For example, in the EFFECT subgroup, 79% reported improved understanding of ETL techniques, and 28% indicated increased interest in accounting as a major. In the APPLY subgroup, these proportions were slightly higher, with 81% reporting improved understanding and 30% indicating increased interest in the major. No formal statistical tests were conducted to compare the subgroups. The comparisons presented here are descriptive and should not be interpreted as statistically significant differences. Future research could employ non-parametric tests (e.g., Mann–Whitney U) to assess whether these observed differences are statistically meaningful. Collectively, the results suggest that students perceive technology-enhanced, hands-on cases as beneficial for understanding ETL and for increasing engagement with accounting, though the influence on major selection was more modest.

Sub-Sample (Q1) Results:

Table 2 presents results obtained for the EFFECT sub-sample. Across the series of questions designed to assess the extent respondents valued the skills gained (BENEFIT) via exposure to the data analytic exercise, most of the respondents indicated perceived usefulness of the technology and the ensuing development of skills obtained after associating with the case. For example, 79% (213) of those included in this sub-sample at least agreed that they gained a more informed understanding of how data analytics can be used in accounting to address redundant tasks. Moreover, 85% (229) and 88% (235) of these same respondents observed similar patterns of usefulness relative to gaining an understanding about how to manage multiple data sets for analysis, and how to use data analytics as a part of proactive analytical reviews of data. Finally, 67% (179) of this group at least agreed that after being exposed to the case, they have confidence in their ability to apply data analytics to manipulate data sets for easy analysis. It

should be noted that all these sub-sample percentages are higher than those reported for the total population (see Table 1).

Relative to perceptions of IMPACT, from a curriculum perspective, 58% (156) of the respondents at least agreed that the case should be used in future offerings of this course. Moreover, 28% (76) of the respondents at least agreed that after being exposed to the case they were more inclined to consider accounting as a major. In comparison, all sub-sample percentages are higher than those reported for the total population (see Table 1).

Sub-Sample: B. APPLY sub-sample (Q10) Results:

Table 3 presents results obtained for the APPLY sub-sample. Across the series of questions designed to assess the extent respondents valued the skills gained via exposure to the data analytic exercise, most of the respondents indicated perceived usefulness (BENEFIT) of the technology and the ensuing development of skills obtained after associating with the case. For example, 81% (200) at least agreed they gained a more informed understanding of how data analytics can be used in accounting to address redundant tasks. Moreover, 86% (212) and 89% (219) of these respondents observed similar patterns of usefulness relative to gaining an understanding about how to manage multiple data sets for analysis, and how to use data analytics as a part of proactive analytical reviews of data. Finally, 69% (170) of these same respondents least agreed that after being exposed to the case, they have confidence in their ability to apply data analytics to manipulate data sets for easy analysis. Like EFFECT reported results, all the APPLY sub-sample percentages are higher than those reported for the total population (see Table 1). In addition, APPLY percentages are higher than those of EFFECT (see Table 2).

Relative to the perceptions of IMPACT, from a curriculum perspective, 60% (150) of the respondents at least agreed that the case should be used in future offerings of this course. Moreover, 30% (73) of the respondents at least agreed that after being exposed to the case they were more inclined to consider accounting as a major. Again, all these sub-sample percentages are higher than those reported for the total population (see Table 1). Finally, these percentages are higher than those of EFFECT (see Table 2). A total of 240 individual student responses were collected in response to the open-ended question, "What were your favorite parts of the Power BI project?" (see Table 4).

Discussion

This study examined whether integrating a technology-based data analytics case into introductory managerial accounting courses could enhance student understanding of ETL processes and increase interest in accounting as a major. The findings provide differential support for our two hypotheses.

Support for Hypothesis 1: Enhanced ETL Understanding

The first hypothesis received strong support, with 78% of students agreeing the case effectively illustrated ETL data analytics power and 72% finding it provided useful practical application examples. Across the BENEFIT dimension, 67-75% of students reported enhanced understanding and skill development, suggesting the hands-on Power BI experience successfully achieved cognitive learning objectives.

Limited Support for Hypothesis 2: Increased Interest in Accounting Major

The second hypothesis received modest support, with only 24% of students indicating increased interest in accounting as a major. This suggests that while students appreciate technological competencies, single-course technology exposure has limited influence on career decision-making.

Subgroup Findings

Students who found the case particularly effective (EFFECT and APPLY subgroups) showed consistently higher percentages across all measures, including career interest (28% and 30% respectively). This suggests that positive initial technology experiences may create reinforcing effects on both learning and professional interest.

Implications

These findings indicate that technology integration can successfully achieve skill development objectives while having more limited recruitment impact. This suggests technology-enhanced cases should be viewed as valuable

pedagogical tools for meeting professional competency requirements rather than as primary strategies for increasing accounting enrollment.

Limitations

This study has several methodological limitations that should be acknowledged. The research employed a single-group, post-intervention design without a control group, limiting the ability to make causal inferences about the technology-based case's effectiveness. The anonymous data collection approach, while promoting candid responses, prevented formal reliability analysis (e.g., Cronbach's alpha) for the survey dimensions and precluded tracking individual student responses over time. Additionally, no formal statistical tests were conducted to compare subgroups, with all comparisons being descriptive in nature rather than statistically tested for significant differences. Future research could employ non-parametric tests such as the Mann-Whitney U test to assess whether observed differences between subgroups are statistically meaningful. The motivational hypothesis relies on a single self-reported item measuring interest in accounting as a major, which limits the strength of evidence supporting this aspect of the findings. Furthermore, the study was conducted at a single institution without collecting demographic information, restricting generalizability and preventing analysis of how student background factors might influence perceptions.

Summary

A follow-up study using a multi-section format—comparing a traditional control group to a Power BI section—would further validate the intervention's effects. Exploring other platforms such as Tableau or Alteryx and expanding to more institutions could improve generalizability. Institutional support and faculty training may also be required to ensure effective implementation of these tools. Future work could incorporate interviews or focus groups to capture richer, qualitative insights and provide additional depth to the quantitative findings presented here.

The present study underscores the critical role of integrating technology-based activities into accounting curriculums to address the decline in accounting majors nationwide. By examining the implementation of the Cuddly Stuffed Animals – Join case, which integrates Power BI software into an introductory managerial accounting course, this research provides compelling evidence of the benefits associated with such pedagogical innovations in real-world classroom settings.

Students overwhelmingly perceive the inclusion of data analytics in introductory accounting courses as beneficial for enhancing their understanding of the Extracting, Transforming, and Loading (ETL) process. This understanding is pivotal as it translates raw data into actionable information, an essential skill in today's data-driven business environment. The positive reception of the case study suggests that students appreciate the hands-on experience and recognize the practical application of these skills in real-world scenarios. This aligns with the increasing demand for technological proficiency in accounting, as highlighted by both academic standards and professional requirements, such as the AACSB accreditation standards and the new CPA exam format.

The findings indicate that the integration of technology not only enhances comprehension but also stimulates interest in the accounting field. While the evidence of a direct increase in students choosing accounting as a major is modest, the data suggests a favorable shift in perceptions that warrants further investigation. Specifically, students who engaged with the Power BI case reported a greater appreciation for the role of data analytics in accounting and expressed confidence in their ability to apply these skills in future professional contexts.

The study's results also reveal significant insights for curriculum design in accounting education. Incorporating technology early in the curriculum can serve multiple purposes: it highlights the relevance and importance of technological competencies in accounting, it provides a platform for active learning, and it can potentially mitigate negative perceptions of the profession. The positive impact on student engagement and perceived usefulness of the curriculum suggests that technology-enhanced learning activities can make accounting courses more attractive and engaging.

Moreover, the sub-sample analysis reinforces these conclusions and provides valuable insights into student preferences. Students who found the ETL process effective and those who appreciated the application of data analytics reported higher levels of perceived usefulness and confidence in their skills. These students also showed a stronger inclination towards considering accounting as a major, compared to the general respondent population. This highlights the potential of targeted, technology-integrated pedagogical strategies to positively influence student decisions about their academic and professional futures.

While the findings offer promising evidence for the use of data analytics in introductory accounting education, it is important to recognize that other pedagogical approaches—such as gamification, simulation, or interdisciplinary projects—may also enhance student engagement and interest in the field. The ecological validity of this study, conducted in an authentic classroom environment without artificial constraints, provides valuable insights into how technology integration performs in real educational settings where such interventions would actually be implemented.

The results of this study also carry practical implications for broader implementation. The Cuddly Stuffed Animals – Join case is readily scalable. Because it is algorithmically generated and self-grading, it can be deployed across multiple course sections or institutions with minimal faculty workload. The consistent instructional materials, video, PDF manual, and structured data files allow for standardized delivery across different settings. Nevertheless, successful scaling may require instructor support in the form of basic training in Power BI and guidance on classroom integration. Institutions might consider offering short workshops or instructional videos to support faculty adoption. While Power BI was the focus of this study, similar learning outcomes could likely be achieved using comparable tools such as Tableau or Alteryx, particularly if implemented within similarly structured, hands-on cases. Future studies could explore these alternative approaches to determine the most effective strategies for increasing enrollment in accounting programs. Additionally, expanding the research across multiple institutions and incorporating alternative technologies would further strengthen the evidence base and inform broader curriculum development efforts.

These findings support our hypothesis that incorporating hands-on data analytics exercises into introductory accounting coursework increases student understanding of the ETL process and has a positive though modest impact on their consideration of accounting as a major. The enhanced perceptions observed among students who engaged with the Power BI case underscore the potential of technology-driven pedagogy to influence both learning outcomes and career interest.

This study contributes valuable insights to the field by demonstrating how practical, technology-enhanced learning experiences can be successfully integrated into existing curriculum structures. Educators and curriculum designers are thus encouraged to incorporate similar tools and case studies in accounting instruction to better equip students for the evolving demands of the profession and potentially reverse the declining trend in accounting majors.

Finally, the modest influence on major selection, despite favorable perceptions of the case and confidence with ETL skills, suggests that one-time exposure is not sufficient to shift students' career intentions. This finding implies that sustained exposure to technology-enhanced accounting content as well as broader institutional support (e.g., advising, recruitment messaging, employer connections) may be needed to significantly increase accounting major enrollment. Extended integration of data analytics, reinforced through consistent messaging and experiential learning, may ultimately create a more compelling value proposition for the profession in the eyes of students.

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Appendix 1 Case Material

The content of the case is as follows:

- Data Elements

The Stuffed Animals Join.Demo.xlsx datafile has five Excel data sheets:

Exhibit 1: Sales Data

Record Elements: Sales Order Number, Salesperson, Region, State, Product Number, and Number of Units Sold.

	A	B	C	D	E	F
1	Cuddly Stuffed Animals					
2	Sales					
3	Sales Order #	Salesperson #	Region	State	Product #	Units Sold
5011	50126	1303	South	WV	106	60
5012	50128	1302	South	KY	102	72
5013	50129	1301	West	HI	101	96
5014	50133	1303	South	KY	102	72
5015	50137	1301	Northeast	ME	103	108
5016	50138	1303	West	NM	102	108
5017	50141	1304	West	AK	102	96
5018	50143	1303	West	NV	102	120
5019	50147	1306	Northeast	NH	106	72
5020	50150	1305	Northeast	NY	106	156

Introduction **Sales Data** Products Salesperson Shipping Costs Region (+)

Exhibit 2: Product Data:

Record elements:
Product Identification Number, Unit Selling Price, Unit Manufacturing Cost, Profit Margin by Product.

	B	C	D	E	F	G
12	Cuddly Stuffed Animals					
13	Product Information					
14						
15	Product ID	Product	Unit Selling Price	Unit Manufacturing Cost	Profit Margin by Product	
16	101	Stuffed Lamb	20.00	8.75	11.25	
17						
18	102	Stuffed Giraffe	22.00	9.75	12.25	
19						
20	103	Stuffed Elephant	24.00	10.75	13.25	
21						
22	104	Stuffed Unicorn	21.00	8.50	12.50	
23						
24	105	Stuffed Horse	23.00	10.75	12.25	
25						
26	106	Stuffed Pig	25.00	12.50	12.50	
27						

Introduction Sales Data **Products** Salesperson Shipping Costs Region (+)

Exhibit 3: Salesperson Data

Record Elements: Salesperson code, Salesperson name, Salesperson title.

	C	D	E	F	G
10					
11					
12	Cuddly Stuffed Animals				
13	Salesperson Information				
14					
	Code	Salesperson		Title	
15					
16	1301	James Polk		Sales Associate I	
17	1302	Ulysses Grant		Senior Sales Associate	
18	1303	Thomas Jefferson		Senior Sales Associate	
19	1304	James Madison		Sales Associate I	
20	1305	James Monroe		Sales Associate I	
21	1306	Grover Cleveland		Senior Sales Associate	
22					
23					
		Introduction	Sales Data	Products	Salesperson Shipping Costs Region

Exhibit 4: Shipping Costs

Record Elements: Product ID, Shipping Region, Cost Per Production and Region

	C	D	E	F	G	H	I	J	K
7									
8									
9									
10									
11									
	Product ID	Region							
		Midwest	Northeast	South	West				
12									
13									
14	101	2.15	2.12	2.08	2.02				
15	102	2.11	2.08	2.04	1.98				
16	103	2.14	2.11	2.07	2.01				
17	104	2.12	2.09	2.05	1.99				
18	105	2.07	2.04	2.00	1.94				
19	106	2.02	1.99	1.95	1.89				
20									
		Introduction	Sales Data	Products	Salesperson	Shipping Costs	Region		+

Exhibit 5: Region

Record Elements: Region Code, Region Name, and States in Region

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1																		
2																		
3																		
4																		
5																		
	Code	Region	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
6																		
7	1	Midwest	IL	IN	IA	KS	MI	MN	MO	NE	ND	OH	SD	WI				
8	2	Northeast	CT	ME	MA	NH	NJ	NY	PA	RI	VT							
9	3	South	AL	AR	DE	FL	GA	KY	LA	MD	MS	NC	OK	SC	TN	TX	VA	WV
10	4	West	AK	AZ	CA	CO	HI	ID	MT	NV	NM	OR	UT	WA	WY			
11																		
		Introduction	Sales Data	Products	Salesperson	Shipping Costs	Region											

- Case Processing

Case processing proceeded as follows:

Step 1: Students initiate the tutorial by first opening data file Stuffed Animals Join.Demo.xlsx.

Step 2: Students open the Power BI software. Students had two options relative to using the Power BI software. The software was accessible via either a school computer lab or available for download to student personal computer at no cost.

Step 3: Students open the video or the pdf file.

Step 4: Students perform the step-by-step instructions while watching or reading the tutorial. The tutorial explains the steps required in Power BI to Extract, Transform and then Load (ETL) the data back into Excel. After these steps, students engage in the ETL process.

Activities reflected in the case are as follows:

Extract Activity

- ✓ Each of the four data files Sales Data, Products, Salesperson and Shipping costs must be separately extracted from the Excel file.

Transform Activity

- ✓ All extra rows on the top of each data table must be removed and then the first row must be converted to the Query Editors' headers.
- ✓ All unnecessary rows and columns must be removed.
- ✓ Fields with restricted values must be reviewed and corrected if there are misspellings (dirty data).
- ✓ Cross-Tabulated data tables must be unpivoted.
- ✓ Join is similar to using the VLOOKUP function in Excel. Join all tables to the Sales Data table by isolating a field or fields that appear many times in the Sales Data table (foreign key) and once in the file being joined (primary key).
- ✓ Create a new field "Shipping Cost" based on the "Shipping per Unit" and "Units Sold" columns.
- ✓ Creating calculation column. Create a "Sales" based on the "Unit Selling Price" and "Units Sold" columns.
- ✓ Change data types to dollars.
- ✓ Create a table by salesperson that shows the number of units sold, sales in dollars and shipping cost and export the table to an Excel "By Salesperson.csv" file. "Shipping Costs by Product and Region.csv" file.
- ✓ Create a "Shipping Costs by Product and Region.csv."

Load Activity

- ✓ Open the original "Stuffed Animals.Join.Demo.xlsx" file.
- ✓ Open the "By Salesperson.csv" file and move the tab to the end of the "Stuffed Animals Join.Demo.xlsx" file.
- ✓ Open the "Shipping Costs by Product and Region.csv" file and move the tab to the end of the "Stuffed Animals Join.Demo.xlsx" file.
- ✓ Create a pivot table to summarize the shipping costs by product and region.
- ✓ Student Interaction

Part of the case involves students answering 10 analytical questions from the generated reports. This reinforces learning about data processing and creates a chance for students to gain the capacity to communicate the process, and results obtained, to others. The questions in the tutorial are:

- 1) What were the sales of the Stuffed Giraffe product in dollars?
- 2) What were the unit sold for the products with the third lowest number of units sold?
- 3) What were the shipping costs in dollars for the product with the fourth highest shipping costs?
- 4) What were sales in dollars for the product with the fifth lowest sales?
- 5) What were the units sold for the salesperson with the third largest number of units sold?
- 6) What was the shipping costs in dollars for the salesperson with the fifth lowest shipping costs?
- 7) What were the sales in dollars for the salesperson with the third lowest sales?
- 8) What were the shipping costs of the Stuffed Horse project in the region with the Stuffed Horse's third lowest shipping cost?

- 9) What were the shipping costs of the Stuffed Koala product in the region with the Stuffed Koala's second lowest shipping cost?
- 10) What were the shipping costs of the Stuffed Panda product in the region with the Stuffed Panda's third highest shipping cost?

- Completion

After completing the tutorial, each student sets up an account at CyberText.com selecting their school, instructor course and section. They then download their own unique data file with over 5,000 rows of algorithmically generated data with unique sales data, products, salespeople, shipping costs and data cleaning characteristics. In addition, the ten analytical questions are randomly assigned to the cases. Note that in the tutorial, the number of units sold and the selling price per unit are used to calculate the sales by invoice. However, in the student's version the Sales by invoice and the selling price per unit are given and the number of units sold must be calculated.

- Case Deliverables

The deliverable of the case consists of two reports exported to the original Excel file.

Exhibit 6: Salesperson Report

This report captures information on a Salesperson basis that shows the number of units sold, Sales in dollars and associated shipping costs.

By Salesperson				
Salesperson	# of units	Sales	Shipping Costs	
Ulysses Grant	36,636	\$818,052.00	\$77,266.44	
George Washington	58,284	\$1,299,192.00	\$123,242.28	
James Monroe	97,152	\$2,162,436.00	\$205,622.64	
John Tyler	78,924	\$1,751,352.00	\$166,596.00	
James Madison	38,388	\$854,412.00	\$81,105.24	
James Polk	77,484	\$1,723,956.00	\$163,717.08	
Total	386,868	\$8,609,400.00	\$817,549.68	

Exhibit 7: Shipping Cost Report

This report captures the cost of product shipping by Product and Region

Shipping Costs by Product and Region					
	Midwest	Northeast	South	West	Grand Total
Stuffed Bear	\$ 26,904.00	\$ 43,048.44	\$ 22,066.20	\$ 41,647.80	\$ 133,666.44
Stuffed Elephant	\$ 54,810.00	\$ 72,060.84	\$ 48,486.60	\$ 86,971.80	\$ 262,329.24
Stuffed Frog	\$ 36,405.60	\$ 52,861.20	\$ 30,753.60	\$ 54,081.00	\$ 174,101.40
Stuffed Koala	\$ 14,094.00	\$ 20,699.28	\$ 14,572.80	\$ 25,364.40	\$ 74,730.48
Stuffed Panda	\$ 16,875.60	\$ 26,664.00	\$ 15,720.00	\$ 23,108.40	\$ 82,368.00
Stuffed Unicorn	\$ 13,648.20	\$ 30,604.32	\$ 18,144.00	\$ 27,957.60	\$ 90,354.12
Grand Total	\$ 162,737.40	\$ 245,938.08	\$ 149,743.20	\$ 259,131.00	\$ 817,549.68

- Review of student work
Students upload their Excel and Power BI files which can then be downloaded 24/7 by instructors.
- Grading
Students access an answer form 24/7 at CyberText.com and get instantaneous feedback 24/7.

Table 1
Student Survey Responses Extract, Transform, and Load (ETL) Data Analytics in Accounting ^a
N = 343

Question	Type	Total Survey Response	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Q1: The case was effective in terms of illustrating the power of ETL data analytics techniques in accounting	ASSIGN	343	114 33%	154 45%	40 12%	18 5%	17 5%
Q10: The Cuddly Stuffed Animals - Join case provided me with a useful example of the application of ETL software in accounting	ASSIGN	343	77 22%	171 50%	55 16%	20 6%	20 6%
Q4: After completing the Cuddly Stuffed Animals - Join case, on cleaning and transforming data, I feel I understand how ETL data analytics techniques can be used to redundantly prepare data for analysis	BENEFIT	343	84 25%	144 42%	71 20%	28 8%	16 5%
Q5: The Cuddly Stuffed Animals – Join case was effective in teaching me how to manipulate multiple data sets into a flat file which can then be easily analyzed	BENEFIT	343	86 25%	168 49%	50 15%	21 6%	18 5%
Q6: The Cuddly Stuffed Animals - Join case increased my knowledge and understanding of the importance of ETL data analytics techniques for the proactive analytic review of data	BENEFIT	343	84 25%	173 50%	55 16%	16 5%	15 4%
Q7: I am confident in my ability to use the ETL data analytics techniques in the future to manipulate data sets into a flat file which can then be easily analyzed	BENEFIT	343	67 20%	127 37%	73 21%	51 15%	25 7%
Q11: The Cuddly Stuffed Animals – Join case should continue to be used in the future in this course offering	IMPACT	343	62 18%	100 30%	90 26%	46 13%	45 13%
Q13: After completing the Cuddly Stuffed Animals – Join case on cleaning and transforming data, I am more inclined to consider accounting as a major	IMPACT	343	31 9%	51 15%	114 33%	78 23%	69 20%

^a This table reports student responses (counts and rounded percentages) to a survey administered to evaluate Cuddly Stuffed Animals – Join, a Power BI-based Extract, Transform, and Load (ETL) data analytics case included in Introductory Managerial Accounting. Likert scales were used where Strongly Agree = 1; Agree = 2; Neither Agree Nor Disagree = 3; Disagree = 4; and Strongly Disagree = 5. Perception evaluations include: 1) the power (EFFECT) and applicability (APPLY) of the case to capture the use of data analytics in accounting; 2) the usefulness (BENEFIT) of skills targeted for development; and 3) the value-relevance (IMPACT) of the case to course content and major selection.

Table 2
Student Survey Responses
Agree Spectrum
Extract, Transform, and Load (ETL) Data Analytics in Accounting – EFFECT^b
N = 268

Q1: The case was effective in terms of illustrating the power of ETL data analytics techniques in accounting (EFFECT)	Type	Total Category Response	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Q4: After completing the Cuddly Stuffed Animals - Join case, on cleaning and transforming data, I feel I understand how ETL data analytics techniques can be used to redundantly prepare data for analysis	BENEFIT	268	81 30%	132 49%	40 15%	14 5%	1 0%
Q5: The Cuddly Stuffed Animals – Join case was effective in teaching me how to manipulate multiple data sets into a flat file which can then be easily analyzed	BENEFIT	268	84 31%	145 54%	30 11%	6 2%	3 1%
Q6: The Cuddly Stuffed Animals - Join case increased my knowledge and understanding of the importance of ETL data analytics techniques for the proactive analytic review of data	BENEFIT	268	81 30%	154 58%	27 10%	5 2%	1 0%
Q7: I am confident in my ability to use the ETL data analytics techniques in the future to manipulate data sets into a flat file which can then be easily analyzed	BENEFIT	268	63 24%	116 43%	54 20%	30 11%	5 2%
Q11: The Cuddly Stuffed Animals – Join case should continue to be used in the future in this course offering	IMPACT	268	61 23%	95 35%	71 27%	29 11%	12 5%
Q13: After completing the Cuddly Stuffed Animals – Join case on cleaning and transforming data, I am more inclined to consider accounting as a major	IMPACT	268	30 11%	46 17%	92 34%	63 24%	37 14%

^b This table reports the student responses (counts and rounded percentages) of a sub-sample of 268 (78%) of the total 343 students who at least agreed (i.e., the total number of Strongly Agreed or Agreed responses) with the statement “*The case was effective in terms of illustrating the power of ETL data analytics in accounting*” (i.e., EFFECT) in a survey administered to evaluate Cuddly Stuffed Animals – Join, a Power BI-based Extract, Transform, and Load (ETL) data analytics case included in Introductory Managerial Accounting. Likert scales were used where Strongly Agree = 1; Agree = 2; Neither Agree Nor Disagree = 3; Disagree = 4; and Strongly Disagree = 5. Perception evaluations include: 1) the usefulness (BENEFIT) of skills targeted for development; and 2) the value-relevance (IMPACT) of the case to course content and major selection.

Table 3
Student Survey Responses
Agree Spectrum
Extract, Transform, and Load (ETL) Data Analytics Application in Accounting - APPLY ^c
N = 248

Q10: The case provided me with a useful example of the application of ETL software in accounting (APPLY)	Type	Total Category Response	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Q4: After completing the Cuddly Stuffed Animals - Join case, on cleaning and transforming data, I feel I understand how ETL data analytics techniques can be used to redundantly prepare data for analysis	BENEFIT	248	78 32%	122 49%	35 14%	13 5%	0 0%
Q5: The Cuddly Stuffed Animals – Join case was effective in teaching me how to manipulate multiple data sets into a flat file which can then be easily analyzed	BENEFIT	248	81 33%	131 53%	26 11%	8 3%	2 0%
Q6: The Cuddly Stuffed Animals - Join case increased my knowledge and understanding of the importance of ETL data analytics techniques for the proactive analytic review of data	BENEFIT	248	79 32%	140 57%	23 9%	6 2%	0 0%
Q7: I am confident in my ability to use the ETL data analytics techniques in the future to manipulate data sets into a flat file which can then be easily analyzed	BENEFIT	248	60 25%	110 44%	45 18%	30 12%	3 1%
Q11: The Cuddly Stuffed Animals – Join case should continue to be used in the future in this course offering	IMPACT	248	58 23%	92 37%	62 25%	26 11%	10 4%
Q13: After completing the Cuddly Stuffed Animals – Join case on cleaning and transforming data, I am more inclined to consider accounting as a major	IMPACT	248	29 12%	44 18%	84 34%	62 25%	29 12%

^c This table reports the student responses (counts and rounded percentages) of a sub-sample of 248 (72%) of the total 343 students who at least agreed (i.e., the total number of Strongly Agreed or Agreed responses) with the statement “*The case provided me with a useful example of the application of the ETL software in accounting*” (i.e., APPLY) in a survey administered to evaluate Cuddly Stuffed Animals – Join, a Power BI-based Extract, Transform, and Load (ETL) data analytics case included in Introductory Managerial Accounting. Likert scales were used where Strongly Agree = 1; Agree = 2; Neither Agree Nor Disagree = 3; Disagree = 4; and Strongly Disagree = 5. Perception evaluations include: 1) the usefulness (BENEFIT) of skills targeted for development; and 2) the value-relevance (IMPACT) of the case to course content and major selection.

Table 4**Top 10 Favorite Parts of the Power BI Project**

This document summarizes the top 10 favorite parts of the Power BI project based on approximately 240 individual student responses. The 'Other' category has been excluded to highlight the most significant themes mentioned. The categories are presented in order from most to least mentioned.

Category	Mentions	Percentage (%)
Learning Power BI / New Software	60	25.0
Building Visuals / Tables / Graphs	24	10.0
Working with Data / Data Analysis	24	10.0
Hands-on Practical Experience / Real World Application	12	5.0
Ease of Use / Instructions / Video Help	12	5.0
Problem Solving / Critical Thinking	12	5.0
Teamwork / Peer Collaboration	12	5.0
Satisfaction / Accomplishment	12	5.0
Technology Skills for Career	12	5.0

