

ADVANCES IN ACCOUNTING  
EDUCATION

# ADVANCES IN ACCOUNTING EDUCATION: TEACHING AND CURRICULUM INNOVATIONS

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# STATEMENT OF PURPOSE

*Advances in Accounting Education: Teaching and Curriculum Innovations* is a refereed academic journal whose purpose is to help meet the needs of faculty members and administrators who are interested in ways to improve teaching, learning, and curriculum development in the accounting area at the college and university level. We publish thoughtful, well-developed articles that are readable, relevant, and reliable.

Articles may be either empirical or non-empirical and should emphasize innovative approaches that inform faculty and administrators as they seek to advance their classrooms, curricula, and programs. All articles should have well-articulated and strong theoretical foundations. Establishing a link to the non-accounting literature is desirable. Further, we expect all manuscripts to address implications for the scholarship of teaching and learning.

Normally, articles that emphasize pedagogy and classroom innovation (e.g., cases, exercises, specific approaches to teaching a topic, etc.) must demonstrate efficacy in a college setting. That is, the authors offer evidence to show that the innovation has been tried and it is effective.

Non-empirical manuscripts should be academically rigorous. They can be theoretical syntheses, conceptual models, position papers, discussions of methodology, comprehensive literature reviews grounded in theory, or historical discussions with implications for efforts to enhance teaching, learning, and curriculum development. Reasonable assumptions and logical development are essential.

Sound research design and execution are critical for empirical reports. Reviewers focus on the quality of method, data, results, and analysis as well as the implications for teaching, learning, and curriculum development.

## Review Procedures

*Advances in Accounting Education: Teaching and Curriculum Innovations* provides authors with timely reviewer reports that clearly indicate the status of the manuscript. Each manuscript is reviewed by at least two reviewers. Authors receive initial reviews normally within eight to twelve weeks of manuscript submission.

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**ADVANCES IN ACCOUNTING  
EDUCATION: TEACHING  
AND CURRICULUM  
INNOVATIONS**

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INVESTOR IN PEOPLE

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**THEME 1**

**DATA SCIENCE AND ANALYTICS  
IN ACCOUNTING**

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# CHAPTER 1

## DATA AND ANALYTICS IN INTRODUCTORY MANAGERIAL ACCOUNTING COURSES

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### ABSTRACT

*Managerial accounting has traditionally played an important role in analyzing data, estimating performance, and offering suggestions. Modern management accountants face evolving expectations, such as contributing strategically to long-term goals and communicating information using visualizations. We specifically focus on how managerial accounting courses and textbooks should integrate data analytics to better prepare accounting students for the current working requirements. This study presents survey findings encompassing perspectives from 23 accounting professors and 46 practitioners. The survey revealed a prevalent endorsement for data analytics integration, with 91% of practitioners and 78% of professors advocating for inclusion. Specifically, 64% of professors support substantial integration compared to 36% of practitioners. About 25% of both groups believe in discussing data analytics in every management accounting topic if not deeply integrated. This study significantly contributes to accounting education literature by combining insights from educators and practitioners regarding the inclusion of data analytics in management accounting. While professors offer guidance on essential materials and practices, practitioners enrich the discussion with practical, workplace-relevant techniques.*

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**Keywords:** Data analytics; integrating data analytics; accounting curriculum; managerial accounting; survey; accounting educators; accounting practitioners

Management accountants are facing the opportunities and challenges that come along with powerful information systems and advanced analytics tools. The escalation in business competition, parallel to advancements in technology, has led to an augmented scope within managerial accounting. This evolution extends beyond conventional historical value reporting, transitioning toward a focus on real-time reporting and predictive reporting (Cokins, 2013).

Contemporary management accountants are important in strategic cost management to attain long-term goals, implement operational checks to assess corporate performance, formulate internal cost activity strategies, and craft financial statements to support managerial decision-making processes. While they are taking heavier duties on data analytics, the managerial accounting course hasn't been changed much in support of their intended roles. To better prepare students, consideration should be given to adding data analytics techniques to management accounting courses to help students analyze and visualize historical data, make meaningful predictions under different scenarios, and explore hidden patterns behind the data using broader sources of internal and external data.

Embracing the changes brought by big data and data analytics, the 2018 Association to Advance Collegiate Schools of Business (AACSB, 2018) standards emphasize the critical role of data analytics with an expectation for accounting faculty to integrate these across undergraduate and master's programs. Specifically, it requires faculty and students to master contemporary and emerging technologies, such as statistical techniques, clustering, data management and analysis, predictive analytics, and visualization. Following that, the CPA exam underwent a significant change in 2022, effective in January 2024 (The American Institute of CPAs (AICPA), 2022b). In particular, technology-focused questions are incorporated throughout all sections of the updated CPA exam. Additionally, accounting educators and professionals have worked together diligently to blend accounting into established STEM (science, technology, engineering, and mathematics) programs through coordinated efforts (The American Institute of CPAs (AICPA), 2022a).

As for how data analytics should be integrated into the accounting curriculum, accounting educators hold different views about whether it should be infused into individual accounting courses or covered in standalone accounting data analytics courses (Richardson & Shan, 2019). Our study specifically focuses on accounting educators' and practitioners' views about whether and how data analytics should be included in introduction-level managerial accounting courses. We surveyed 23 managerial accounting professors and 46 management accounting practitioners to collect their opinions about the data, software, and specific techniques they expect students to learn in introductory managerial accounting courses.

This study contributes to the accounting education literature by presenting survey results on the perspectives of both accounting educators and practitioners regarding the inclusion of data analytics in the introductory managerial accounting course and the techniques to be integrated. Specifically, accounting professors offered valuable insights into the combination of required teaching materials and laboratory practices, while practitioners contributed significantly by sharing their experiences with the techniques crucial for students to master in a professional environment.

The remainder of this study provides background information on the accounting industry's changes in response to deeper integration with data analytics, a description of research questions and survey methodology, and a discussion of findings and conclusions.

## BACKGROUND

### *Data Analytics Skills Requested by the Accounting Accreditation*

In response to technological advancements, the 2018 AACSB standards underscored the significance of data analytics, particularly reflected in standard A5. This standard necessitates that faculty and students cultivate proficiency in contemporary technologies while remaining adaptable to emerging ones. These technologies encompass a spectrum including statistical techniques, clustering, data management, modeling, analysis, text analysis, predictive analytics, learning systems, and visualization (AACSB, 2018).

### *Data Analytics Skills Requested by the AICPA via the CPA Exam*

In the transformative landscape of the CPA exam, 2022 witnessed significant adjustments in its testing contents. Traditionally, the CPA exam encompassed four integral sections: auditing and attestation (AUD), business environment and concepts (BEC), Financial Accounting and Reporting (FAR) and regulation (REG). Starting from January 1, 2024, candidates are required to take three mandatory examinations in AUD, FAR, and REG, along with one out of three specialized discipline exams: business analysis and reporting (BAR), information systems and controls (ISC), or tax compliance and planning (TCP). An important point to highlight is that while the BAR and ISC sections rigorously assess candidates on various aspects including data analytics, technical accounting, information systems, information security, and IT audit, the expanded CPA exam format also integrates technology-related questions across all its sections. This comprehensive approach to technological aspects signifies a significant shift in the examination structure, emphasizing the broader relevance of technology across the entire accounting landscape. This shift not only demands a broader skill set from candidates but also acknowledges the indispensable role of technology in shaping the future of accounting practice and expertise.

In the revised uniform CPA examination blueprint, managerial accounting and cost accounting are primarily tested in the BAR section, with a specific

emphasis on variance analysis techniques. From a data analytics perspective, candidates are expected to showcase their ability to select the appropriate variance analysis method for evaluating key cost drivers within diverse business scenarios. Meanwhile, they are required to hone their skills in interpreting sales outcomes by conducting comprehensive analyses involving price, volume, and mix assessments. This comprehensive evaluation not only tests candidates' understanding of fundamental accounting principles but also underscores the critical role of analytics and cost assessment in contemporary business contexts.

#### *Data Analytics Skills to Show Evidence of Technology in Accounting*

In response to the growing combination of technology and accounting, concerted efforts have been undertaken by accounting educators and professionals to integrate accounting into established STEM programs. This strategic initiative seeks to ensure congruence between the knowledge and skill sets of accounting graduates and the evolving requisites of a fiercely competitive global market. An instance of this endeavor materialized through the introduction of the H.R. 3855 Accounting STEM Pursuit Act of 2021 before the United States House of Representatives Education and Labor Committee on June 11, 2021, during the 117th Congress. This legislative proposal aimed to amend the Student Support and Academic Enrichment Grant program, advocating for the inclusion of accounting within STEM education. The proposal intended to foster early career awareness in accounting within a comprehensive STEM educational framework, especially targeting elementary and secondary school students. This legislative proposal garnered substantial support from esteemed bodies such as AICPA, the Center for Audit Quality, the Diverse Organization of Firms, the National Association of Black Accountants Inc., and the American Accounting Association.

In tandem with this legislative endeavor, the AICPA made a compelling case on July 29, 2022. It proposed the inclusion of accounting and relevant Classification of Instructional Program codes within the Department of Homeland Security's STEM Designated Degree Program List, categorically under the "T" for technology. This proposed reclassification sought to better articulate the requisite skill sets and competencies expected of accounting professionals. Upon approval, this reclassification would offer foreign students enrolled in STEM-designated accounting programs an extended optional practical training period of up to 24 additional months in U.S. post-graduation programs, beyond the standard year. These programs underscore specialized areas encompassing data analytics, software development, cloud computing, and other burgeoning technological innovations.

#### *Data Analytics Skills Increasingly Needed in Management Accounting*

In recent years, the function of management accountants has undergone substantial evolution. Traditionally, management accountants typically rely on accumulated historical data to illustrate the financial situation of a company. However, as the current business environment increasingly demands more immediate and pertinent insights, financial statements often prove inadequate as a primary

information source for managerial decision-making. In the contemporary landscape, management accountants play a pivotal role in aiding management by evaluating organizational performance through internal data analysis and offering decision-centric insights derived from both internal and external data sources. Their responsibilities encompass more than just generating descriptive reports to address past queries but include forecasting future scenarios (Nielsen, 2015). Specifically, modern management accountants now engage in various facets of business: contributing to strategic cost management for achieving long-term objectives, implementing operational controls to measure corporate performance, devising internal cost activity plans, and preparing financial statements to aid decision-making processes alongside management (Brands & Holtzblatt, 2015).

The Institute of Management Accounts (IMA) published its Management Accounting Competency Framework<sup>1</sup> (MACF) in 2019. It offers valuable insights and demonstrates the significance of management accounting as a bridge that enables students to integrate knowledge spanning both accounting and non-accounting domains. This integration aims to prepare them for careers in accounting and finance, ensuring their relevance in the digital age. The framework delineates six core domains of management accounting knowledge and skills, encompassing (1) Strategy, Planning, and Performance; (2) Reporting and Control; (3) Technology and Analytics; (4) Business Acumen and Operations; (5) Leadership; and (6) Professional Ethics and Values. Within these domains, there are 33 competencies identified. Furthermore, the MACF provides detailed guidance on the subject knowledge and techniques required to attain proficiency at five levels: limited, basic, applied, skilled, and expert.

Following the MACF, Venkatesh et al. (2023) recommended a three-course management accounting model which suggests a step-by-step advancement from limited to skilled proficiency levels that students ought to attain in each course within the six domains. The three courses are Course 1 – Principles of Management Accounting, Course 2 – Intermediate Management Accounting, and Course 3 – Advanced Management Accounting. They suggested that the first course (the focus of our study) should prioritize focusing on the overall strategy of a company. From the technology and analytics perspective, the first management accounting course should incorporate discussions about the important role of data analytics and visualization, such as the effects of Big Data, Machine Learning (ML), and Artificial intelligence (AI) on management accounting (Venkatesh et al., 2023). The study of Losi et al. (2022) provides survey results showing that asking the right questions (supported by 43.4% of participants), applying appropriate data analytic techniques (supported by 21.2% of participants), and effectively communicating (supported by 27.4% of participants) results, interpreting results (supported by 28.3% of participants) are the top four skills that should be included in the cost accounting course. Basis programming languages associated with ML and AI are suggested to be covered in accounting information systems (18.6%), data analytics courses taught by the accounting department (38.9%) or other departments (22.2%), or graduate level courses (22.3%) (Losi et al., 2022).

Responded to the rapidly increasing demand for incorporating data analytics into the accounting curriculum, many accounting scholars have provided teaching cases as supplementary teaching material to conventional textbooks. For example, [Peters and Chiu \(2022\)](#) designed 34 interactive Excel spreadsheets that cover 8 core calculative principles included in management accounting. [Calderon et al. \(2022\)](#) offer a framework to integrate “R” programming at multiple levels of complexity into the accounting curriculum.

Especially, visualizations have become commonplace in business applications ([Dilla et al., 2010](#)). Traditional accounting techniques have long relied on quantitative and statistical methodologies predominantly derived from structured data. Contemporary management accounting is facing rising demands for both explanatory visualizations and exploratory visualizations. Managers are seeking effective and interactive visualizations, such as dashboards, to deliver performance matrices as well as using clustering or other analytical visualizations to detect groups, trends, and common behaviors.

Moreover, the broader sphere of business management prefers analysis outcomes to be presented in easily comprehensible formats ([Davenport, 2014](#); [Kohavi et al., 2004](#)). Consequently, reports often employ pie charts, heat maps, geographic maps, and similar graphical representations to facilitate swift comprehension ([Davenport, 2014](#)). Typically, management prefers streamlined and easily understandable analyses and reports. Although enterprise systems are designed to enable intricate predictions and optimizations, management accountants are expected to adeptly communicate these findings using clear and easily interpretable visualization tools ([Appelbaum et al., 2017](#)).

Additionally, contemporary accounting has expanded the realm by integrating methods rooted in ML, AI, deep learning, text mining, and data mining ([Calderon & Cheh, 2001](#); [Oracle, 2015](#); [Schneider et al., 2015](#); [Warren et al., 2015](#)). A better understanding of ML and AI can help accounting professionals automate repetitive working processes, validate the effectiveness of AI tools, review source documents, analyze business transactions ([Cho et al., 2020](#)), improve accounting estimates ([Ding et al., 2020](#)) and recognize the cybersecurity risk that is associated with audit risks ([Calderon & Gao, 2020](#)). PWC firms in mainland China and Hong Kong reinvested AI-enabled productivity gains to elevate the quality, quantity, or efficiency of producing goods and services and generating expanded output from the same level of input ([Likens & Wakefield, 2023](#)). Consequently, their reinvestment achieves a 30% reduction in time for systems design, realizes a 50% increase in efficiency for code generation, and experiences an 80% decrease in time dedicated to internal translations ([Likens & Wakefield, 2023](#)).

## RESEARCH QUESTIONS

To comprehend the necessity and methods to integrate data analytics into managerial accounting courses, we surveyed managerial accounting professors as well as accounting practitioners within the managerial accounting domain. This survey seeks to gather viewpoints from both academic and industry angles regarding