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Toward integration of Big Data, technology and information systems competencies into the accounting curriculum[☆]

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ABSTRACT

Recent initiatives of the American Accounting Association (AAA) and the Association to Advance Collegiate Schools of Business International (AACSB) have emphasized the importance of integrating Big Data and technology into the accounting curriculum. In response to these calls and to identify a common body of instructional resources toward this purpose, our paper uses the lens of the Competency Integration for Accounting Education framework to provide examples of Big Data and information systems integration into instructional resources. We loosely frame these instructional resources using accounting course subjects as the unit of analysis.

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1. Introduction

There is new impetus for the accounting profession to understand Big Data and business analytics, creating a growing opportunity for accounting educators to integrate these topics into the curriculum. Big Data generally describes datasets that contain volumes of differently structured data that traditional technology and information systems are inadequate to process and analyze (Cao, Chychyla, & Stewart, 2015; Vasarhelyi, Kogan, & Tuttle, 2015; Warren, Moffitt, & Byrnes, 2015). More specifically, Big Data is often characterized using the four Vs: volume (large volume of data), veracity (data from different sources increasing the likelihood of uncertainty in the data), velocity (analysis of streaming data) and variety (analysis of different types of data structures, such as structured, semi-structured, and unstructured data) (Zhang, Yang, & Appelbaum, 2015). We define business analytics as the technology and information systems that enable Big Data analysis and reporting in businesses using different analytic techniques.²

Accounting firms and professional associations recommend that Big Data, technology, and information systems be integrated into accounting coursework to provide students with the necessary skills and knowledge to adapt to the data-centric environment. For instance, PricewaterhouseCoopers (2015) outlined recommendations for analyzing Big Data related to

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² Gartner Research. (2016) categorized analytics into four types: (1) descriptive (a retrospective inspection of data to find out “what happened?” using tools such as visualization and narratives), (2) diagnostic (a retrospective analysis of data to find out “why did it happen?” using tools that enable drilling-down into the data, making correlations), (3) predictive (a prospective analysis to find out “what will happen?” using tools capable of statistical algorithms and machine-learning technique), and (4) prescriptive (a prospective analysis to find out “what should be done?” using tools capable of graph analysis, simulation and optimization, and other advanced techniques).

technical competencies in audit, tax, risk management, and consulting. The AAA facilitated the exploration of Big Data and analytics in the accounting profession by hosting Big Data conferences that resulted in educational webinars, teaching materials, and a call for collaboration between academics and practitioners. The AACSB emphasized the importance of integrating Big Data and business analytics into the accounting curriculum. Specifically, the AACSB's revised accounting accreditation standard A7 released in 2013 indicates that AACSB accredited accounting degree programs should include learning objectives to develop skills and knowledge related to the integration of information technology into accounting and business. This includes the creation, sharing, and reporting of data, as well as data mining and analytics (AACSB, 2013).

There is a continuing call for information systems and technology competency integration in the accounting curriculum (e.g. AAA, 1986, AECC, 1990, AICPA, 1996; Behn et al., 2012; AACSB, 2013; Lawson et al., 2014). Apostolou, Dorminey, Hassell, and Rebele (2014) recommended that educators strive to describe and study a common body of AIS knowledge for accounting majors and that AIS topics be integrated throughout the curriculum in a way that coordinates topics and reinforces the way that they are learned.

In response to these calls, we provide a method based upon Lawson et al.'s (2014) Competency Integration for Accounting Education framework (hereafter, framework) for educators to integrate information systems and technology competencies relevant to Big Data and business analytics into the accounting curriculum. Additionally, we synthesize and organize the extant Big Data and business analytics instructional resources available (e.g. case studies, software tools, and data) into the core groups of accounting competencies laid out by Lawson et al. (2014).

Lawson et al. (2014) describe an integrated competency-based framework of learning outcomes necessary for accounting graduates' success. Their framework categorizes competencies into accounting, foundational, or broad management (see Table 1). The accounting competencies, "enable accountants to integrate management and analytical methods, supported by technology, to assist an enterprise to formulate and execute its strategy successfully" (Lawson et al., 2014). These competencies are typically taught in required courses such as principles, intermediate, and advanced financial accounting; management and cost accounting; accounting information systems (AIS); auditing; and taxation. While many information systems, such as enterprise resource planning (ERP), eXtensible Business Reporting Language (XBRL), information search and retrieval, and data mining, may be covered in the AIS course, we suggest these competencies be integrated throughout the accounting curriculum.

Lawson et al.'s (2014) technological competency is their foundational competency that is most relevant to our paper. It includes outcomes such as knowledge of spreadsheet modeling; use of technology to access Big Data for financial analyses; use of communication technologies, such as interactive data visualization; knowledge of information systems design; knowledge of the purpose of information systems and Big Data, including the hardware and software that enable them to run; and related issues, such as computer security and business continuity.

Our paper exemplifies the competency integration framework proposed by Lawson et al. (2014) by providing examples for integrating information systems and technological competencies with discipline-based accounting competencies into course subjects required by most institutions. Discussing the information systems and technological competencies within a course context allows educators to identify applications of the competency where *all* accounting students in a program are exposed to specific learning opportunities, thus affording them the same opportunity to acquire the competency.

2. Curriculum integration methods

The approach we develop integrates Big Data, information systems, and technologies into the accounting curriculum and is particularly relevant to department curriculum committees. Our process recommends that faculty who are teaching the requisite courses for accounting majors be the ones to identify the desired level of integration. This should be based on criteria such as available resources, faculty competencies and interests, compliance with accreditation and licensing requirements, and input from advisory boards. The process could include conducting a gap analysis to identify the "as-is" current state of integration in the curriculum and the "to-be" state of the desired integration. Once a list of the two states is created, the difference is analyzed to identify areas for improved integration. Faculty can then match the desired integration area with the available resources appearing in Table 2 of Appendix A. Table 2 in Appendix A provides a listing of representative articles of instructional cases and materials categorized by course and competency area using Lawson et al.'s (2014) framework to provide suggestions on how these competencies can be integrated. We provide examples and suggestions based on an analysis of teaching cases and other resources generally available to educators and of offerings from software vendor academic alliances (see Appendix B). The examples demonstrate the integration of typical discipline-based accounting competencies with technological and information systems competencies emphasizing Big Data and business analytics.³

2.1. Financial accounting

Financial accounting is often taught at the introductory, intermediate, and advanced levels. The Pathways Commission Report (Behn et al., 2012) recommends that the first accounting course, often the financial principles course, take advantage

³ We do not attempt to provide examples for every possible integration of competencies that we found in the instructional resources. As Lawson et al. (2015) suggest, alternative approaches are possible and encouraged.

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