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Integrating Accounting Themes with Enterprise System Experiences: An Accounting Department's Journey

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Integrating Accounting Themes with Enterprise System Experiences: An Accounting Department's Journey



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Abstract

This article provides our department's experiences with utilizing enterprise systems as part of teaching accounting concepts in a thoughtful, integrated fashion across the accounting curriculum. We describe how a specific enterprise system (SAP) has been used to design integrated accounting and technology experiences across an accounting curriculum. The description of our curriculum integration design, our integration process, and preliminary outcomes presented in this paper can be useful background to accounting systems educators involved in similar efforts at their institutions.

Keywords

Experiential Learning, Enterprise Systems, ERP, Accounting Education, Accounting Information Systems Education

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INTRODUCTION

The accounting discipline has a long history of linking foundational accounting concepts to accounting practice in real-life business situations (Black 2012; Pathways Commission 2012). Most recently, the Pathways Commission (2015) has argued for an interdependent approach to accounting education that includes technology, ethics, communication, and global components in concert with traditional accounting foundational knowledge. The goal of such an integrated approach is to support the development of professional judgment for business decision-making over time, and through many progressive learning experiences, for the future accounting professional. A key element of the 2015 Pathways Commission work was a finding by the Technology Task Force that "**accounting programs should integrate** knowledge of current and emerging accounting and business information **technologies throughout the curriculum**" (2015, 9, emphasis added). The curriculum content standard of the Association to Advance Collegiate Schools of Business (AACSB) also stresses the importance of an integrated knowledge of business information technology capabilities (AACSB 2016).

Modern day accounting systems are increasingly part of large, comprehensive, enterprise systems like enterprise resource planning (ERP) software packages (Simkin et al., 2015). Accounting information now lives in data sources that reside in, or pass through, ERP software systems. These systems have become a company's "system of record" and often a key data source for business analytics initiatives (Forbes Insights 2015; PwC 2015b).

Figure 1 illustrates the Pathways Commission's thinking about how an accounting professional's preparation contributes to the overall economic prosperity of society. The left-hand-side image shows how accountants recognize economic activity and use critical judgment to transform such data into useful information for decision-making. The right-hand-side and middle columns indicate the integration of computing foundational knowledge with accounting/information systems competencies of input-process-output leading to decision-making activities. The profession's recommended integrated competencies (see Figure 1), and volatile business and technology environments, demand that educators incorporate creative approaches to providing accounting education.

Accounting educators recognize the importance of adding spreadsheet and database software experiences to accounting curriculum (Simkin et al., 2015), but there is limited written guidance for integrating ERP system experiences specifically within accounting curriculum. Curiously, although research highlights the pivotal role of accounting educators in spearheading early university ERP initiatives (Bradford et al., 2003; LeDuc 2014; Mandal and Flosi 2012), there are only a few published accounts of ERP experiences within the accounting context (Bandyopadhyay et al., 2013; Blount et al., 2016; Etnyre and Lehmann 2015; Watson et al., 2016).

For the most part, ERP usage has been profiled in general business curriculum research. Hands-on experiences with ERP software packages (such as SAP or Microsoft Dynamics GP) can improve student learning around traditionally difficult topics such as the importance of integrated information systems (Léger et al., 2010), the complexities and elements of purchasing and sales business processes (Rienzo and Han 2011), and the multidisciplinary processes for business decision-making (Cronan et al., 2011). Some business educators have demonstrated the utility of an ERP-enabled case to an integrated business curriculum (Cannon et al., 2004), though the examined outcomes looked across, rather than within disciplines.



Figure 1: Integrated Accounting and Information Systems Competencies (Pathways Commission 2015, 10)

Additionally, a recent accounting study illustrated the usefulness of large-scale integrated business simulations for accounting decision-making (Riley et al., 2013). Charland and colleagues (2015) demonstrated that using integrated business simulations enhances business student knowledge about the complex nature of ERP systems. Importantly, ERP simulations can positively influence student learning in ill-structured problem situations (Léger et al., 2012). Decision-making and ill-structured problem situations are all possible future activities for professional accountants.

Most important to this paper is the promise of utilizing ERP software experiences within accounting curriculum as a way of trying to address signature pedagogy criteria outlined by the Pathways Commission (adapted from Pathways Commission 2015, 9; Shulman 2005, 55-57):

- Pervasive and routine educational experiences, cutting across topics and courses, programs, and institutions;
- "Public performances" in the learning environment;
- Accountability for (learning) work;
- Active and interactive learners;
- Structured to experience adaptive anxiety (and uncertainty).

The Pathways Commission 2015 report argues that "interaction with the profession" (Pathways 2015, 9) should become a signature pedagogy for accounting; in other words, the "characteristic forms of teaching and learning" (Shulman 2005, 52) that underlie how novice accountants are prepared to enter the accounting profession. Table 1 provides a description of why we postulate that using ERP software as part of educational preparation for the accounting profession may address these signature pedagogy features.

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Signature Pedagogy Features (Shulman 2005, 56-58)	How ERP experience applies
Pervasive and routine educational experiences, cutting across topics and courses, programs, and institutions	Using SAP-ERP in multiple (accounting) courses will provide a regular learning environment for students to learn about enterprise systems. Additionally, using SAP- ERP can provide a realistic job preview for company work.
"public performances" in the learning environment	Students using SAP-ERP can experience software used in the real-world, complete with data issues, errors, and troubleshooting.
Accountability for (learning) work	Students using SAP-ERP are assigned to individual user areas for work completion, thus students are individually accountable for completing the work.
Active and interactive learners	Students using SAP-ERP are actively interacting with the software. Using SAP- ERP is not a passive learning exercise.
Structured to experience adaptive anxiety (and uncertainty)	SAP-ERP software is feature-rich and can lead to multiple outcomes, both expected and unexpected. Students using SAP-ERP may regularly encounter uncertainty, excitement, and anxiety in a moderately risky environment. Successful instructors structure the experience to manage the anxiety levels so that learning occurs, rather than paralysis due to fear of failure.

Table 1: How ERP experience can address signature pedagogy features

The goal of this paper is to provide a descriptive example of an accounting department's approach to meeting the technology integration challenge outlined by the Technology Task Force of the 2015 Pathways Commission. This paper builds upon prior technology integration work by Etnyre and Lehmann (2015). Our research provides a rich exposition and discussion of SAP integration across an accounting curriculum that extends the earlier examination of SAP integration for AIS and MIS programs (Etnyre and Lehmann 2015). We use a qualitative case study method (Yin 2013) so that other accounting departments can gain insights about ERP system integration from an accounting perspective. The remainder of this paper will discuss our approach and early reflections on selecting, adopting, and integrating an ERP system (i.e., SAP-ERP and related software) across our accounting curriculum. The next section details background about our university, college, and department that informed our curricular decisions and choice of ERP system. We then explain our specific uses of ERP experiences to address over-arching accounting learning themes. We discuss preliminary outcomes from our approach. We conclude the paper with a reflective summary of lessons learned, our future plans, and the limitations of our approach of using ERP in accounting curriculum.

BACKGROUND

Environment: University, College, Department, Programs

Our university is well known for offering a classical liberal education and is the largest private school in our state. University enrollment is consistently between ten and eleven thousand and is split 60%/40% between undergraduate and graduate students. We offer 90 majors at the undergraduate level and 60 graduate degrees including business, engineering, and law. Our AACSB accredited college of business is the second largest in the state with annual enrollment averaging 2,300 undergraduates. We offer undergraduate degrees in seven disciplines: accounting, entrepreneurship, ethics and business law, finance, management, marketing, and operations and supply chain management.

Our accounting department currently includes nineteen full-time and approximately fifteen to twenty part-time faculty members. We offer accounting curriculum for an undergraduate accounting degree, Masters of Science in Accountancy, and support various MBA degrees. We graduate an average of 100 undergraduate accounting majors each year. One challenge of our undergraduate and graduate curriculum is that neither program offers a required information systems course where students gain knowledge about integrated business processes and systems. Other academic institutions often use such a course to expose business students to integrated business technologies such as ERP (for instance, see Cannon et al., 2004 and Kohers 2015). Our department saw this challenge as an opportunity to use ERP system experiences in multiple accounting courses as a way to add integrated business technology knowledge for our accounting graduates.

Goals: University, College, Department

Our university mission encourages faculty to develop students who can "think critically, act wisely, and work skillfully to advance the common good" (University of St. Thomas, 2017). The university culture values the thoughtful, deliberate, and in-depth teaching efforts put forth by its faculty members to achieve this mission. Additionally, our university enjoys a long history of involvement with its neighborhood, business, and regional communities. Within this milieu, our college and department have a strong tradition of blending conceptual knowledge with the exigencies of practical application in the workplace environment. We value practice-based teaching and research that provides our students with knowledge, skills, and abilities to be able to contribute to society with skillful work. Further, recent strategic initiatives at the university and college levels encourage curricular changes to support employment demand for analytics knowledge.

The organizational environment of our institution provides a hospitable climate for curricular integration efforts in general, and our specific attempt to integrate accounting and systems knowledge within the accounting curriculum. Our accounting department, in particular, is fortunate to have an advisory board of seasoned executives drawn from Fortune 100 companies, international and regional public accounting and service firms, and other regional employers. Our initial discussions with university, college, and departmental stakeholders encouraged our faculty team to develop student learning experiences that emphasize long-lasting, transferrable skills and abilities rather than a "one-off", isolated training session. Thus, we sought to explore ERP software options that would be consistent with our institutional culture, values, curricular goals, and employment trends.

Choice of ERP software: why SAP?

Any choice we made regarding the use of software in support of accounting learning objectives across our accounting curriculum would require that faculty believe it is consistent with learning objectives, and that the benefits of adopting the software outweigh the costs. We also needed to consider the availability and backgrounds of our adjunct faculty members who make up a large portion of our faculty staffing pool. Our initial college and departmental discussions considered commonly used integrated software packages including Intuit's QuickBooks, Oracle, SAP, and NetSuite.

At the time we were considering software packages the worldwide market for ERP software was \$25.4 billion (Gartner, Inc. 2014). The top five vendors made up 53% of the total market. The largest vendor, SAP (24%), had twice the market share of its next closest competitor Oracle (12%). Oracle's market share was also twice that of its next three closest competitors Sage (6%), Infor (6%), and Microsoft (5%). In addition to being the market leader, our decision to choose SAP software was motivated by the following considerations:

- Accounting firm representatives and corporate recruiters in our area indicated that:
 - incoming entry-level hires need more exposure to large-scale enterprise systems and integrated data processes to on-board more successfully;
 - \circ the company demand for ERP knowledge is unmet in our region;
 - student exposure to a market-leading ERP software may help with company knowledge transfer to other large-scale enterprise systems (e.g., an Oracle ERP implementation will share enterprise functions similar to those encountered in SAP);
 - the "Twin Cities is an SAP town" and that students with awareness and skills using SAP software would be in high demand by regional recruiters and employers;
- Faculty colleagues at similarly sized, four-year institutions encouraged our ERP interests as well as willingly provided us with examples of successful integration processes and curricular ideas for SAP;
- Data from SAP solutions can be used in SAP analytics solutions as well as other market-leading software options (e.g., Tableau);
- SAP provides robust academic partnership opportunities for university faculty and students (including hosted access to real-life software, curriculum materials built around integrated scenarios can be used for multiple courses, faculty training, and academic licenses for SAP Windows software solutions)¹. Bradford and colleagues' research (2003) highlighted Watson's (2001) value proposition of SAP resting on six elements: software donation, hosting options, curriculum development and support, research support, professional development opportunities, and networking possibilities. Figure 2 illustrates the SAP University Alliance value proposition set forth by Watson (2001).

¹ While some of the other ERP vendors do provide training and/or materials designed for use in the classroom (e.g., Oracle Academy or Sage Education Alliance Program), we determined that SAP had the most appropriate combination of training and materials for our purposes.



Figure 2: SAP University Alliance Value Proposition (Watson 2001 as reported in Bradford et al., 2003)

Integration process

College and department efforts culminated in our university gaining acceptance into the SAP University Alliance (UA) partnership with the SAP-AG Company in summer 2011. SAP University Alliance is a formalized division within SAP AG that encourages learning institutions to interact with one another, SAP company experts, and SAP software solutions (SAP University Alliance, n.d.). Membership in SAP UA grants the institution access to the UA curricular materials and the SAP software hosted at a University Competence Center (UCC - currently five worldwide, reported by Kohers 2015: Chico, CA; Milwaukee, WI; Magdeburg, Germany; Munich, Germany; and Brisbane, Australia). Members pay an annual fee to SAP and the assigned UCC for access to and support of the hosted SAP software.² Once an academic institution is approved for membership, a local faculty member is designated as the SAP UA Faculty Coordinator and the institution is assigned to one of the UCCs for SAP software access and support. SAP-trained faculty members can then work with the local SAP UA Faculty Coordinator and the support staff at the UCC to setup and deliver SAP software curriculum as part of academic coursework.

By January of 2012, three college faculty members had participated in initial SAP-ERP training (the entry course for SAP UA faculty). By attending the SAP-available training sessions, we became aware of the successful SAP integration efforts at California State University-Chico, Sam Houston State University (Texas), Grand Valley State University (Michigan), Western Michigan University, and Salisbury University (Maryland). Our SAP UA Faculty Coordinator took advantage of the interaction with other SAP faculty (new and experienced) to discuss and learn about effective ways to use SAP UA materials in accounting coursework. Further, we contacted

² Full details of the SAP UA program and membership requirements are beyond the scope of this paper. Interested readers are directed to Kohers 2015 and Bradford et al., 2003 for some additional details, and the authors are available to answer reader questions about the SAP UA membership application and approval process.

experienced SAP UA faculty at Grand Valley State University and California State University-Chico to discuss our early integration plans. Based on these early consultations, we shaped our integration approach along two guiding dimensions: (1) using UA curriculum from the Business Process Management and Accounting Information Systems curriculum areas³, and (2) concentrating our limited resources on SAP UA curriculum we could use in conjunction with accounting topics, since our college does not have a required information systems course in our programs.

We pilot tested the Introduction to ERP with Global Bike, Inc. - Sales Order Cycle (GBI-SD) material (SAP University Alliance Curriculum 2016) on 109 undergraduate business students in selected sections of a required managerial accounting course in spring 2012. We pilot tested the Classic Rockers Accounting Internal Controls curriculum (Daigle et al., 2015) with graduate accounting students in fall 2012. In January of 2013, our department received a grant from PwC to provide more SAP training for faculty members to jump-start additional SAP integration within our curriculum. In February of 2013, several accounting department faculty members attended the SAP Academic conference to learn about other uses of SAP software to support curriculum choices.

In August of 2013, we were able to bring an SAP Certified Associate (and SAP UA faculty member) to our campus to train eighteen university faculty members in a 30-hour SAP training seminar. The on-site training enabled us to expand our curricular SAP integration into additional undergraduate courses (cost accounting), additional sections of undergraduate managerial accounting, and to extend types of SAP usage to include applying data analytics techniques to SAP data in academic year 2013-14. Additional accounting department and college faculty began attending the SAP training opportunities in academic year 2014-15, and this faculty development activity has translated into curricular opportunities for SAP usage across the college. In 2015-16, we achieved a stable offering of multiple accounting course integration of accounting concepts and SAP usage, and now are able to present the SAP Student Recognition award to students meeting our award criteria. Figure 3 provides a graphic timeline of some of our key integration process events.

Two recent studies have addressed the integration of ERP curricula and can be used to help place our efforts into a broader context. Blount and colleagues (2016) review the current ERP literature and investigate what actions are being taken to integrate ERP into university curriculum. They evaluate 11 articles (out of an original sample of 335) and briefly summarize actions taken by the schools in these articles to integrate ERP into their curriculum.

Hepner and Dickson (2013) analyze articles from the ERP literature focusing on studies that provide details of ERP program integration. They identified 17 articles and categorized them into one of five levels (defined in Antonucci et al., 2004). Eight of these articles were classified as either a level 1 (curriculum not defined) or Level 2 (one or more courses defined with concepts but big picture ERP is lacking), three were classified as Level 3 (several courses defined and relationship between courses maintained), one as Level 4 (courses and concepts integrated in multiple disciplines) and five as Level 5 (ERP curriculum is managed for effectiveness, efficiency, and consistency across disciplines).

³ SAP UA curriculum materials are currently organized within 15 areas: Accounting Information Systems, Business Analytics, Business Process Management, Cloud Computing, Customer Relationship Management, Database Management, Design and UX, Enterprise Resource Planning, Human Capital Management, Internet of Things, Mobile, S/4 HANA, Software Engineering, Supply Chain Management, and Young Thinkers. The SAP UA "train-the-trainers" sessions provide faculty with knowledge about specific UA course materials and location within these 15 areas.





In addition to the levels used by Hepner and Dickson (2013), Antonucci and colleagues (2004) suggest three dimensions used to describe ERP education programs. We modify two of these dimensions to describe a space in which we place a sample of schools associated with the SAP UA. The dimensions are 1) the number of different disciplines or courses identified as ERP related and 2) the depth of coverage within the courses. Figure 4 shows the authors' school and a sample of 11 other schools. This figure provides a general sense of the range of where other undergraduate programs are in their ERP integration efforts and provides a relative comparison for our school⁴.

To place schools on the horizontal dimension the authors visited each school's website and tried to identify how many undergraduate ERP related courses are offered and across how many disciplines. To place schools on the vertical dimension we tried to assess each course's depth of coverage by reading course catalogs and descriptions. In addition, we read any information the school provided about ERP related majors, concentrations, or certifications and included this in our analysis. While this analysis is subjective, it does help provide a sense of where school undergraduate programs are relative to one another.

⁴ Our focus here is on the integration of ERP courses into the undergraduate business programs. Graduate programs, online programs, and certification courses not included as part of undergraduate tuition were excluded.



Figure 4: Sample of Comparison Schools Implementing ERP

Our sample appears to be consistent with the pattern levels in Hepner and Dickson (2013). The lack of schools in the bottom right quadrant suggests that schools start by offering general ERP instruction within one or two disciplines and as the depth of coverage increases, more classes seem to be offered across a larger number of disciplines⁵.

ERP FEATURES, ACCOUNTING THEMES AND CURRICULUM INTEGRATION

Overview

As more accounting faculty members acquired SAP training and were able to consider how to leverage the software experiences in tandem with accounting concepts, we gradually refined our choices to five accounting themes that could benefit from integrating hands-on SAP experiences. This section will provide a discussion of our rationale for these decisions. We begin with a description of the particular ERP features and SAP curriculum we chose to integrate. We then discuss how the accounting themes are supported by the ERP features and evidenced across our accounting curriculum. Table 2 illustrates a summary of the chosen accounting themes, how the themes map to ERP features, and the accounting curriculum integration.

⁵ Of course it is possible that we have a biased sample and that a different or large sample would have a significant number of schools in the bottom right quadrant. Our original sample included nine other schools but we were unable to compile enough information from their school webpages to compare them to the 12 that appear in the table.

Accounting theme	ERP feature	Curriculum Integration
Information for Decision-making	Business transaction cycles (Order-to-cash; Procure-to- pay; Product Costing)	Managerial accounting (undergrad) – Sales Case (GBI-SD); ERPSim Distribution; Product Costing (GBI-CO-PC)
	Cost Center Hierarchy; Cost Allocation & Assessment	Cost accounting (undergrad) – Cost Center Accounting (GBI-CO- CCA)
	Simulated company operations; team competition (ERPSim: Sales, Procurement, Production, Budgeting and Forecasting)	Advanced managerial decision- making (Graduate; ERPSim Manufacturing)
Profitability (Contribution Margin; Variable Costs)	Simulated company operations; team competition (ERPSim: Sales, Procurement, Budgeting and Forecasting)	Managerial accounting (Undergrad) – ERPSim Distribution
Internal Controls	Business transaction cycles (Procure-to-pay; Production; Order-to-Cash; Accounting; Application Controls)	Accounting information systems (Undergrad, Graduate) - Classic Rockers; GBI-AIS-SOD
Integrated business data and processes	Simulated company operations; team competition (ERPSim: Sales, Procurement, Budgeting and Forecasting)	Accounting information systems (undergrad, Grad) – ERPSim Distribution
Analytics	Team generated data from simulated company operations; team analysis (ERPSim: Sales, Procurement, Budgeting and Forecasting)	Managerial accounting (undergrad) – ERPSim Distribution, SAP Lumira Accounting information systems (undergrad, Grad) – ERPSim Distribution, SAP Lumira, Excel Pivot Table/Chart Tableau

Table 2: Linking Accounting Concepts with ERP Features for Curriculum Design

ERP Features and SAP Curriculum Modules

Enterprise Resource Planning (ERP) systems are large, comprehensive, software systems that enable businesses to integrate business processes and data across the multiple activities in a business organization (Bradford 2015; Simkin et al., 2015). Most ERP systems are organized into "modules", or groups of related system programs, for accomplishing similar functional tasks (Bradford 2015). SAP-ERP includes modules for Sales & Distribution (SD), Financial Accounting (FI), Controlling (CO), Materials Management (MM), Production Planning (PP) and others to support the information and data needs of essential business functions.

The UA curriculum materials are organized and supported within specific learning scenarios, so that data can be pre-loaded and maintained in time-delimited system areas for faculty and student use in coursework. Early UA efforts focused on using SAP AG corporate training packets and data that emphasized best practices for SAP-ERP software usage (Cannon et al., 2004; Corbitt and Mensching 2000). Subsequent UA efforts have resulted in curriculum materials situated within contextual learning scenarios that emphasize business processes as well as specific best practices for SAP-ERP software usage. We found the following UA learning scenarios to be the most relevant to our accounting curriculum integration: Global Bikes, Inc. (GBI); ERPSim; and Classic Rockers.

The Global Bikes, Inc. (GBI) scenario provides activities within the context of a fictitious international manufacturer of high-end bicycles (SAP University Alliance Curriculum 2016). The GBI learning scenario is a general-purpose ERP learning area and includes curriculum for business processes, analytics, and accounting-systems topics (e.g., segregation of duties, transaction cycles, and basic financial reporting). The UA design and maintenance of the GBI learning scenario enables the sharing of this context across different courses, whether across the discipline (accounting), the college/program (Business), or university. The GBI learning scenario is designed in such a way as to support instructors who wish to use only portions of the full ERP operations (e.g., Controlling) as well as those instructors who wish to use multiple sections (e.g., Procurement, Production, Sales, Accounting). We have used the GBI Sales Case (from a Sales and Accounting perspective, using the SD and FI modules) and the GBI Product Costing and Cost Center Allocation Cases (from a Controller's perspective, using the CO module).

The ERPSim scenario(s), developed by HEC Montreal, are distinctive business simulation technology environments that enable learners to experience business decision-making using an actual SAP-ERP software system (Léger et al., 2013). The ERPSim scenarios rest on an active learning pedagogy where teams of learners engage in immersive decision-making situations and the simulation technology environment automates some of the ERP activities. A simulation-trained instructor runs the simulation environment within multiple time-compressed "rounds" of activity. Each team of learners forms a company operating in a German marketplace that competes with other companies to earn sales revenue and profitability. Each round of activity requires the teams to use and interpret the information provided by the SAP-ERP system. ERPSim situations include Bottled Water Distribution, Dairy Products Logistics, and Muesli Cereal Manufacturing.

The ERPSim learning environment supports learning-by-doing and increases operational complexity as time progresses through the simulation rounds. For example, in the Bottled Water Distribution setting the team operations move from a focus on Sales and Marketing decisions in Round 1 to adding Procurement decisions in Round 2 and finally layering on additional Forecasting decisions in Round 3⁶. Further, the importance of astute financial management differs depending on the chosen decision situation (e.g., Distribution, Logistics, or Manufacturing) used for the ERPSim experience. We have used the Bottled Water Distribution, Muesli Manufacturing, and Dairy Logistics ERPSim games at different times in our accounting curriculum.

Classic Rockers scenario, developed by Sam Houston State University faculty, emphasizes the accounting internal controls that are evidenced in SAP-ERP (Daigle et al., 2015). Classic Rockers is a fictitious rocking chair manufacturing company headquartered in the southwest United States. This learning scenario supports an integrated case using Procurement (MM), Production (PP), Sales (SD), and Accounting (FI, CO) modules of SAP. We have used both the full-integrated

⁶ A full explanation of this ERPSim learning scenario is beyond the scope of this paper. More details about specific simulation activities and context can be found in Léger et al., 2010 and 2013.

case (Procurement through Accounting modules) and an abridged integrated case (Procurement and Accounting) in our accounting curriculum.

Theme 1: Information for Decision-making

A common theme underlying the accounting discipline is that "accounting is the language of business" that permits an understanding of a business entity's performance and standing in financial terms (Harrison et al., 2010). Accounting information in most modern companies draws from multiple data sources that can include large, integrated, enterprise systems like ERP. Accounting students, as future entry-level accounting generalists, benefit from having an awareness of the real-life systems that collect, process, and report upon a company's financial standing. Business students, of any functional specialization, need an appreciation of how business occurs in major business entities, how financial transactions (e.g., sale) are actually enacted through large systems, and the level of detail that needs collecting to support such financial activity.

We introduce these concepts in our two required core accounting courses in our undergraduate business program – financial accounting and managerial accounting. We chose to integrate the use of enterprise systems in the second of these two courses as a means of providing active experience with business transactions rather than just learning how to solve textbook problems, and to gain an early experience participating in company business processes. Having this exposure early in the business curriculum allows us to leverage deeper functional understanding of business processes and data in upper-level courses using SAP. Positioning SAP usage early in this core requirement is similar to what some schools have accomplished with an introductory information systems course (e.g., see Cannon et al., 2004).

Another example of building the "information" theme with SAP usage is in our cost accounting sequence that begins with our undergraduate cost accounting course and extends into our graduate advanced managerial decision-making course. Our undergraduate accounting majors, often first exposed to SAP in the earlier managerial accounting course, are then able to leverage that hands-on experience in the more specific examination of cost allocation fundamentals with practical application in SAP.

One of the major themes underlying the pedagogy of our cost accounting course is how different decisions require different information. While the typical cost accounting textbook problems provide students some opportunities to select relevant information from a limited set of data, they don't allow students to develop an appreciation for the process through which the data are made available and rarely do they illustrate how earlier decisions affect the quality and scope of that data. To help our cost accounting students gain an appreciation for how an information system affects the quantity, quality, and scope of the data they use in decision-making, we have integrated a UA case that requires students to work within SAPs controlling function (GBI CO-CCA). The case requires students to instantiate functional departments, to populate those departments with some initial cost information, to build relationships between the departments based on some assumptions about underlying business process, and finally to use those relationships to allocate costs between departments.

Students are exposed to the complexities of working within a larger ERP system including how data types, access rights, formats, and orders of operation function by the time they complete the case. They have also gained hands-on experience in how sensitive the final cost allocations, and decisions made based on those allocations, are to changes (errors) in setting up the system relationships and data. At the completion of the case students often comment on how "surprisingly difficult" it is to even get the data that is usually presented as the starting point for textbook problems. As a result, they often develop a deeper appreciation of the different-decisions-requiredifferent-information course theme.

Theme 2: Profitability

Company profitability themes begin in our required introductory financial accounting core course with the coverage of financial accounting fundamentals and primary company statements. In our second core course, managerial accounting, we emphasize the internal company mechanisms and financial monitoring of operational decisions that contribute to overall company profitability. We use the specialized ERPSim curriculum to permit small teams of students to compete against one another with simulated operations of a Bottled Water Distribution company. The use of the ERPSim game provides an active learning experience for our business students that bring to life the interrelationships of sales revenue, costs, contribution margin, and profit within a functionally integrated company situation. Each student team lives through the information review and decisionmaking under uncertainty due to imperfect and ill-timed information most companies regularly experience by using computerized systems. The experience provides two outcomes: (a) an early, live, tangible experience of company operations with financial outcomes; and (b) quick and early introduction to large-scale enterprise systems and integrated business data and processes.

Theme 3: Internal Controls

We introduce accounting internal controls in the undergraduate auditing course, but specifics about how these are manifested in actual accounting systems are typically addressed in the required upper-level undergraduate accounting information systems (AIS) course. Our use of SAP to explore internal controls (especially application input controls and segregation of duties) enables us to enhance our accounting student understanding and appreciation for the role of such elements in a company's financial systems. The hands-on experience, with a real-life enterprise system where students are entering their own data, reinforces the fundamental definitions and understanding of how internal controls function in a live system. Class discussion and reflective question assignments assist students in building a personal understanding of the effects of internal control designs. Our undergraduate AIS course typically uses the extensive SAP UA Classic Rockers scenario that examines the internal control topics of application input controls and segregation of duties in the Revenue (Order to Cash), Purchasing (Procure to Pay), Production, and Accounting (Financial, Controlling) business cycles in a manufacturing company (Daigle et al., 2015). Our graduate AIS course (and on-demand undergraduate independent study courses) use the specialized "Accounting information systems using GBI (North America Only)" curriculum produced by Jones and Mensching (2013) that focuses on the internal control topics of segregation of duties and the SAP configuration settings necessary to support proper accounting system functioning for the Purchasing (Procure to Pay) and Revenue (Order to Cash) cycles. The SAP UA "AIS using GBI" curriculum also includes a demonstration of the authorization system within SAP-ERP that implements segregation of duties. When our required undergraduate AIS course can regularly use the same SAP UA curriculum scenario and setting as earlier coursework (e.g., Global Bikes, Inc.), we will be able to extend student knowledge of how an enterprise system implements internal controls and how these internal controls affect company operations within a consistent learning scenario.

Theme 4: Integrated Business Data and Processes

Accounting students gain both conceptual and technical knowledge of how business transactions affect financial performance and how they are recorded. However, they often do not appreciate the precursor conditions necessary for execution of those business transactions nor the timing and pace of the effects of those transactions on a company's overall operations.

Our use of SAP provides hands-on experiences with end-to-end business processes that add a deeper dimension to student understanding of the nature of integrated, shared data and processes across many functional specialties/divisions. For many accounting students, the competitive nature of the ERPSim emphasizes how large a difference the use of an information system (e.g., the people, process, and technology) can make in a business' financial performance.

Theme 5: Analytics

The topics of analytics and data science are becoming critical knowledge for business professionals in general (Davenport 2013), and accounting specialists in particular (Forbes Insights 2015; PwC 2015a, 2015b). AACSB requires accredited business programs to include "data creation, data sharing, data analytics, data mining, [and] data reporting" as knowledge areas for business degrees (AACSB 2016). Recently, the American Accounting Association, a professional organization of accounting academics and practitioners, sponsored an inaugural annual conference entitled "Accounting IS Big Data (AiBD)" (American Accounting Association 2015). Although the use of Excel features such as Pivot Tables can raise student skill levels for introductory data manipulation abilities, these abilities are quickly becoming the necessary but not sufficient skill-level for real-life scenarios. As companies and firms begin using data for predictive purposes (e.g., predictive analytics) and/or using unstructured data sources as well as structured data sources to look for repeatable patterns or anomalies, accounting curricula must adjust to accommodate these new needs.

Our college has chosen to focus our analytics efforts initially at the graduate curriculum level with resources directed towards a cross-disciplinary Masters of Science degree offered with our School of Engineering. Our undergraduate accounting program has limited room for additional coursework in analytics and our existing courses have limited room for extensive analytics coverage. Our accounting department traditionally emphasizes Excel skills in response to firm and company feedback. Thus, our SAP analytics usage is currently limited to SAP visual analytics tools to examine profitability outcomes from the ERPSim experience in our managerial accounting course (described below). In our upper-level AIS course, we expose students to the strengths and weaknesses of data visualization software options of Excel, SAP Lumira, and Tableau.⁷ As our college works to augment our undergraduate business curriculum with additional preparation in analytics knowledge (as indicated by AACSB), our department will adjust our SAP analytics coverage accordingly including additional topics such as advanced data visualization and predictive analytics.

We introduce analytics topics in selected sections of our core required managerial accounting course as a follow-on activity to the use of enterprise systems for understanding profitability. Although the ERPSim experience is fun and engaging, and though the adrenalin of competition drives home the importance of managing costs and revenue, often the experience moves so quickly that students have little time to reflect upon decisions and outcomes. We link a data visualization exercise using SAP Lumira software⁸ to explore the team sales results from the

⁷ One of the authors is currently involved in data collection for a research study measuring the effectiveness of our current analytics instructional resources.

⁸ SAP Lumira software is one of SAP's analytics solutions that permits line-of-business self-service analytics, rather than analytics provided by an Information Systems/Technology organizational function. Lumira is part of SAP BusinessObjects solutions and connects to SAP data sources as well as Excel and common text file data sources. Lumira supports "visual-based data discovery" (Gartner 2017, 2) similar to market competitors Tableau, Qlik, and Spotfire.

ERPSim experience. The goal of the data visualization exercise is to analyze team performance compared to other teams based on metrics that might have escaped notice "during the heat of the simulation experience". Students use an author-developed instructional packet that provides a primer covering visual analytics and SAP Lumira software. Students build and use visualizations to explore sales data using measures (e.g., sales revenue, contribution margin, and pricing) and dimensions (e.g., team/company, quarter, and product). Early anecdotal evidence indicates that this additional visual analysis helps students understand the effects of their ERPSim decision-making and outcomes, as well as gain an appreciation for the growing topic of business analytics.

We build upon this early analytics experience in our later AIS course. We use the data generated from playing the ERPSim game as data sources for several analytic explorations: MS Access database queries, Excel spreadsheet Pivot Tables and Charts, SAP Lumira and Tableau software for data visualization. Anecdotal evidence suggests that the post-hoc analysis helps students to appreciate the effects of business decisions within an integrated systems environment. Further, using multiple analytic tools has sparked useful discussions of strengths and weaknesses of various software solutions.

PRELIMINARY OUTCOMES

We are now approximately five total years into our ERP integration journey and have completed two years of stable course offerings. We are in the process of developing formal quantitative feedback mechanisms for our alumni, recruiters, and current students. In this section, we present early results from our business community contacts, the number of SAP Student Recognition Awards, and student perceptions about the usefulness of ERP integration efforts.

Business Community Interest/Recruiting/Placement

We have experienced increased interest in our accounting graduates as we have expanded our integration of enterprise systems within our accounting curriculum. The interest has taken the form of increased company/firm requests to interact with students through our Accounting Club, a change in some company/firm interview questions to students, and different full-time placements where integrated business process knowledge is useful (e.g., public accounting risk assurance practice, healthcare organizations, and larger corporations). Additionally, we have begun fielding inquiries from regional companies about our plans for extending our integration of enterprise systems learning experiences into graduate and professional education offerings. As our curriculum integration has expanded, several company recruiters have begun asking students about their understanding of integrated business processes and enterprise systems (e.g., SAP) as part of initial and follow-up interviews (Personal email communication 2016) as shown by the following anonymous comments from student course evaluations from a managerial accounting class:

"I was asked about SAP in an interview with Blue Cross Blue Shield."

"All accounting interviews I have had for internships have talked about the importance of SAP within companies."

"Employers like that I had a background knowledge of SAP. It is helpful for more majors than Accounting."

Gartner's Magic Quadrant for Business Intelligence and Analytics Platforms positions SAP in the Visionaries quadrant, near the border with the Leaders quadrant (Gartner 2017, 5).

SAP Student Recognition Award

Our growth in providing integrated accounting and enterprise systems experiences has enabled us to begin awarding an SAP Student Recognition Award. The SAP Student Recognition Award is not a market-recognized SAP certification⁹, but does indicate to external audiences that the bearer has satisfactorily completed a program of study utilizing the SAP Product Portfolio at the institution as part of a degree program.

The SAP UA Faculty Coordinator works with SAP UA North America to designate certain courses as eligible for earning the award (e.g., a "SAP-enhanced course"). SAP UA reviews the institution's course materials to ensure a proper balance of business content is covered in concert with the hands-on SAP usage (about 1/3 course time). Once the coursework is approved by SAP, and there are enough courses to permit student achievement of SAP's integration guidelines, the institution can administer an award process. At our university, we have two levels of SAP-enhanced courses: (a) an introductory, or awareness level, of SAP-enhancement (15-25% of SAP coverage) and (b) an intensive level of SAP-enhancement (>30% of SAP coverage). We use the following criteria to evaluate student requests for award consideration: (a) satisfactory completion of the SAP assignments in the course; (b) earning a grade of "B" or better in the particular course; and (c) completing the correct combination of SAP-enhanced courses to meet university and SAP recognition requirements.

In our first year of stable offerings of SAP-enhanced coursework, we were able to present five students with the SAP Student Recognition Award. In our second year, we presented eleven students with the award.

Student perceptions of ERP integration

The authors reviewed course evaluation forms from SAP-enhanced sections of managerial accounting (2012-2016) and accounting information systems (2014-2016). We extracted text comments related to SAP to an Excel spreadsheet for examination and simple analysis. Table 3 presents the counts and percentages of our content analysis of anonymous student comments. For the most part, student perceptions have been positive about the SAP experience and cluster within two areas: (a) actual company or accounting function usage of ERP software and (2) skill/knowledge for business career. Representative positive comments are in Table 4.

⁹ SAP AG Education offers SAP certification to SAP customers for a number of SAP-specific solutions. Historically, UA member schools were able to provide only TERP10 certification so as not to compete directly with SAP AG Education marketplace offerings. In June 2017 SAP University Alliance leadership announced 20 additional certification offerings that UA member schools can provide to students. A full explanation of these market-recognized SAP certifications is beyond the scope of this paper, but further information is available through the Contact Us link at the SAP UA webpage (https://www.sap.com/training-certification/university-alliances.learning-center.html).

Academic year	2011-	2012-	2013-	2014-	2015-	2014-	2015-
	2012	2013	2014	2015	2016	2015	2016
Undergraduate course	MA	MA	MA	MA	MA	AIS	AIS
(Managerial accounting=MA,							
Accounting information							
systems =AIS)							
# students	109	101	97	65	32	39	62
# evaluation forms	98	92	88	59	29	38	56
# forms with Comments	56	65	71	44	11	32	32
SAP Comments Count	5	42	35	21	4	18	8
SAP Comment %	9%	65%	49%	48%	36%	56%	25%
Positive SAP Comment %	100%	83%	94%	100%	100%	94%	100%
Negative SAP Comment %	0	17%	6%	0	0	6%	0

Table 3: Frequencies of Anonymous Student Comments about SAP usage

Table 4: Representative	Anonymous	Student	Comments
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Actual company/accounting function usage	Skill/knowledge for business career
of ERP software	
"I really enjoyed the use of SAP in class, it	"I think learning SAP is a great skill for us to
helped me to gain knowledge of how actual	learn."
companies can use technology."	"I really found the [SAP] technology
"Using SAP it helped deepen my	exercises helpful. While they do take a lot of
understanding of accounting."	time to complete, I know that they will be
"I liked the SAP because it is a real application	very applicable to my future career in
of accounting."	accounting."
"I think using SAP in the course is good as it	"I really enjoy the use of SAP, it makes me
shows us the type of software that real	feel like I have a better grip on accounting in
companies and accountants use."	the real world."
"I really like we got to use the [SAP] system	"By learning about SAP, I was able to compare
so we could see what companies actually use	it with Microsoft Dynamics which I used in my
in the real world."	internship. This experience helps me a lot in
	understanding more about ERP systems, which
	I found extremely helpful for my future
	career."
	"I thought the SAP software was one of the
	best aspects of the class. I am definitely
	interested to see how it will work in
	Operations. I thought the way we approached
	SAP this semester was beneficial because I
	thought it was important to understand the
	concepts before using the software. The way
	SAP is taught I would feel comfortable doing
	basic functions and holding a conversation
	with a potential employer about the software "
	"SAP was surprisingly pretty fun "
	SAF was surprisingly preuvinui.

Some students continue to hold negative perceptions about SAP usage, as a representative negative comment regarding the detailed UA case study materials notes: "SAP was pretty point and click pointless/irrelevant to my course learning." Interestingly, this comment occurred in a managerial accounting section where a classmate wished to use SAP more in future classes to become "fluent" in the software before graduation. We are cautiously optimistic that as we develop more robust measures of student perceptions and student learning, our evidence will mirror other university experiences (for example, see Léger et al., 2012, 2015).

REFLECTIVE DISCUSSION

Our integration journey is far from complete, and continues to evolve, as faculty gain more expertise in providing accounting-focused learning experiences that involve SAP. We have encountered some of the same curricular innovation issues experienced by our colleagues in information systems and operations areas (see Becerra-Fernandez et al., 2000; Corbitt and Mensching 2000; Cannon et al., 2004; Fedorowicz et al., 2004). We have also encountered some very different challenges by focusing our efforts within the accounting discipline. In this section, we highlight these lessons learned and our future directions so that other accounting educators can profit from our experiences in their own curricular developments.

Lessons Learned – Faculty Concerns

We found that the most common obstacle to moving faculty from curiosity about an ERP system to actual classroom integration is the concern of how much time it will take for faculty members to get up to speed. Our faculty recognized the signals coming from accounting firms and the larger business community about the importance of ERP systems in the business environment. However, faculty members still needed to see a value proposition that would persuade them to invest time and energy into learning the ERP system to a level where they were comfortable teaching it to students. Getting faculty trained to a level that they can integrate the material into their classes represents a significant and ongoing cost of both time and money. Some of the ways we have addressed this challenge have been college funding for SAP face-to-face training, university teaching grants for new-to-SAP instructors to partner with a more senior SAP-enhanced faculty member, the use of training areas (e.g., sandbox clients) at the University Competence Center to allow faculty exploration of SAP UA curricula and enterprise data, and inviting other faculty to observe (and participate) along with students when SAP exercises are used in a class session. We have been most successful when we start with small explorations and then build to more time-intensive exercises as the faculty member's confidence with SAP grows.

Another common obstacle in faculty adoption is that enterprise systems are, by their very nature, large, comprehensive systems that can be difficult to understand and use. Learning to use SAP, let alone be in a position to teach others to use SAP, can be a personal learning experience that may be more akin to living abroad in a foreign country to gain language fluency by not only speaking the words, but also immersing one's self in the culture and layered meanings of the words. Learning to use SAP takes time, practice, repetition, and an ability to deal with adaptive anxiety (see Shulman 2005). The software can have many paths to different outcomes, and this means that sometimes the actions taken by a user might result in unexpected incorrect outcomes. A faculty member needs to be comfortable with saying "I don't know" to him or herself, and being confident enough to ask or look for help. When the uncertain outcomes occur within a classroom setting with students, the faculty member needs to be comfortable with turning the unexpected into a learning

moment where the faculty member can coach the students through an investigation of what occurred (e.g., troubleshooting).

One of the most useful lessons we learned in our adoption is the importance of having a faculty member serve as an ERP department coordinator. Not only does this provide a central contact point across time and within a term for faculty to turn to for assistance, but the coordinators from different departments can offer suggestions and help plan curriculum changes that intentionally reinforce concepts across disciplines. A coordinator can advocate for continued faculty training and use of the ERP software. One further role that a coordinator can play is to communicate to faculty that the department, college, and business community support the adoption and integration of ERP systems. Continued emphasis of this message can allay faculty members' fears that they might be committing their time to a passing trend.

We learned that assisting faculty members in building a support network that is broader than the local institution has significant value. An actively involved Faculty Coordinator can link local faculty members with those at other institutions who might be good resources for common topic areas. The Faculty Coordinator can link new faculty members with key staff resources at the University Competence Center. Further, continuing to invest in faculty training at the face-to-face SAP training opportunities offers faculty a way to continue to build a personal network of other SAP experts.

We found that investing in a local support setup, beyond the human resources of a Faculty Coordinator, builds additional value for curricula efforts. We have built useful website resources, training videos, and institution-specific written documentation for use by both faculty and students using SAP. Part of our local support infrastructure includes training 3-4 students as SAP student experts who can assist in-the-classroom when faculty conduct an SAP exercise, as well as provide additional email support for students using SAP outside of the classroom.

One of the basic learning curves to any ERP system is learning to navigate the interface. When students have the opportunity to learn to navigate the ERP system in earlier coursework, faculty members who teach discipline-specific courses are more comfortable adopting and using the software in these later-sequenced courses. To the extent that the ERP is adopted by other disciplines within a college, faculty and students benefit from early introduction and repeated exposure to the software.

Encouraging faculty to explore and use existing cases and curriculum material can present a relatively low-cost way to spread adoption and build support for broader adoption. After gaining experience integrating ERP materials into a class, faculty might be encouraged and supported to think of other topics or course concepts that could be illustrated or reinforced via ERP exercises. To-date, we have relied upon informal sharing among faculty members to build support for broader adoption and we will need to take steps to regularize such sharing among faculty beyond our department.

Lessons Learned – Student Concerns

We learned that our current undergraduate students tend to expect their use of enterprise systems to be similar to how they interact with apps on their mobile devices and laptop computers. We found that when we introduce SAP exercises, we need to be very clear that students need to be willing to accept that SAP does not behave like common desktop or mobile application packages. We have been most successful when we can frame this potentially unsettling experience as a learning opportunity that can be leveraged into a resume-worthy skill and ability valued by future employers.

Support for students needs to include in-the-classroom support as well as out-of-classroom support. Some of our locally developed videos for installing software and demonstrating how to perform common tasks in SAP are a way to provide on-demand support for our students. We found that beginning an SAP exercise in the classroom/lab provides useful immediate guidance for the majority of students. Judicious usage of our SAP student experts in the classroom has been a two-fold benefit: (1) students respect and enjoy getting one-on-one help from another student (rather than the instructor), and (2) our SAP student experts gain experience and confidence in their SAP understanding.

A final lesson learned has been that we need to talk more about how the SAP exercise has meaning in terms of the accounting concepts. Students are eager to know why the exercise is being done before performing it, as well as during the exercise, and during a debriefing session after the exercise is completed.

Future Directions

We have a three-part plan to continue integrating enterprise systems into our curriculum. First, we plan to increase the depth of coverage within classes that currently support SAP. We plan to accomplish this by introducing additional SAP exercises into existing introductory SAPenhancement courses. Second, we plan to increase the number of classes that integrate SAP. Initially we plan to increase the number of managerial accounting course sections that feature the introductory level of SAP-enhancement. We then intend to begin introducing SAP examples into some of our upper-level financial accounting coursework (e.g., intermediate accounting, auditing, advanced accounting) and our MBA program accounting coursework (for example, cost accounting, and auditing are likely candidates). Finally, we plan to expand the breadth of SAP coverage across different business disciplines by exploring opportunities to work with our colleagues across the college in some topic coursework that may be useful to all business specialties, such as Financial Analytics and Enterprise Business Processes. Ideally, we plan to design some instructional cases that link enterprise system usage, extracted enterprise system data, and data analytics in support of college and university strategic initiatives.

In addition to the above curriculum integration plans, we also intend to develop measures of market demand for ERP skills. We know it would be useful collect data on the placement of our accounting graduates and in particular those that earn the SAP Recognition Award. By collecting such data we can begin to assess, in a pre-post fashion, the impact ERP skills have on the initial job opportunities. We further believe that there would be valuable feedback by conducting follow-up interviews with our graduates and asking whether they view their ERP education as having enhanced their career development. Collecting and reporting this type of data could prove useful in garnering further support for ERP integration, especially as we begin to reach out to other disciplines.

Limitations

A limitation of this case study is that we have few metrics for effectiveness of our approach. We are still evolving our ERP integration approach in our accounting curriculum and are in the process of developing concrete efficacy measures. Hepner and Dickson (2013, 316) state that most "organizations will not see performance improvements for four or five years after [an ERP] implementation," and we reached a regular offering of ERP integration options just two years ago. Other schools can learn from our account but should be aware of the early nature of our results. In particular, recent research by Khoury and colleagues (2015) may assist schools in gaining an additional perspective on common obstacles to ERP integration efforts.

CONCLUSION

The accounting profession continues to evolve in response to the changing business and technology environment. Accounting education programs must also evolve to meet the real-life challenges facing our graduating young accounting professionals. This paper provides a descriptive study of our experience integrating an enterprise resource planning system across our accounting curriculum. We hope that other accounting educators may be able to use our experience to gain insight into some of the challenges and opportunities they may encounter when considering integrating enterprise systems into the curriculum at their own institutions.

REFERENCES

- American Accounting Association. 2015. Accounting IS Big Data (AiBD). <u>http://commons.aaahq.org/groups/cea5c9d7d1/summary</u> (July 6, 2016).
- AACSB. 2016. "Eligibility procedures and accreditation standards for business accreditation (Standard 9)." Accreditation Standards, last modified January 31, 2016, <u>http://www.aacsb.edu/~/media/AACSB/Docs/Accreditation/Standards/2013-bus-standards-update.ashx</u> (March 30, 2016).
- Antonucci, Yvonne L., Gail Corbitt, Glen Stewart, and Albert L. Harris. 2004. "Enterprise systems education: Where are we? Where are we going?" *Journal of Information Systems Education*, 15, no. 3: 227-234.
- Bandyopadhyay, Kakoli, Gisele J. Moss, and Alicen Flosi. 2013. "ERP integration in the accounting curriculum." *Competition Forum*, 11, no. 2: 215-219.
- Becerra-Fernandez, Irma, Kenneth E. Murphy, and Steven J. Simon. 2000. "Integrating ERP in the business curriculum." *Communications of the ACM*, 43, no. 4: 39-41.
- Black, William H. 2012. "The activities of the Pathways Commission and the historical context for changes in accounting education." *Issues in Accounting Education*, 27, no. 3: 601-625.
- Blount, Yvette, Babek Abedin, Savanid Vatanasakdakul, and Seyedezahra Erfani. 2016.
 "Integrating enterprise resource planning (SAP) in the accounting curriculum: a systematic literature review and case study." *Accounting Education*, 25, no.2: 185-202.
- Bradford, Marianne, B.S. Vijayaraman, and Akhilesh Chandra. 2003. "The status of ERP integration in business school curricula: Results of a survey of business schools." *Communications of the Association for Information Systems*, 12, no. 1 Article 26: 437-456.
- Bradford, Marianne. 2015. *Modern ERP: Select, Implement and Use Today's Advanced Business Systems, 3rd edition.* Raleigh, NC: Lulu.com.
- Cannon, David M., Helen A. Klein, Lori L. Koste, and Simha R. Magal. 2004. "Curriculum integration using enterprise resource planning: An integrative case approach." *Journal of Education for Business*, 80, no. 2: 93-101.

- Charland, Patrick, Pierre-Majorique Léger, Timothy P. Cronan, and Jacques Robert. 2015. "Developing and assessing ERP competencies: Basic and complex knowledge." *Journal of Computer Information Systems*, 56, no. 1: 31-39.
- Corbitt, Gail and James Mensching. 2000. "Integrating SAP R/3 into a college of business curriculum: Lessons learned." *Information Technology and Management*, 1, no. 4: 247-258.
- Cronan, Timothy P., David E. Douglas, Omar Alnuaimi, and Pamela J. Schmidt. 2011. "Decision making in an integrated business process context: Learning using an ERP simulation game." *Decision Sciences Journal of Innovative Education*, 9, no. 2: 227-234.
- Daigle, Ronny, Fawzi Noman, and Ross Quarles. Classic Rockers Case: Processing transactions through the logistics and support processes of SAP with an emphasis on internal control. Version 2.0. 9/15/2015. Available to SAP UA member schools through SAP University Alliance Learning Hub – Accounting curriculum.
- Davenport, Thomas H. 2013. "Analytics 3.0." Harvard Business Review, 91, no. 12: 65-72.
- Etnyre, Vance and Constance Lehmann. 2015. "Use of software and collaboration tools to integrate AIS and MIS curricula." *AIS Educator Journal*, 10, no.1: 43-67.
- Fedorowicz, Jane, Ulric J. Gelinas Jr., Catherine Usoff, and George Hachey. 2004. "Twelve tips for successfully integrating enterprise systems across the curriculum." *Journal of Information Systems Education*, 15, no. 3: 235-244.
- Forbes Insights. 2015. "Audit 2020: A Focus on Change." June. http://www.forbes.com/forbesinsights/kpmg_audit/index.html.
- Gartner, Inc. 2014. Market Share Analysis: ERP Software, Worldwide, 2013.
- Gartner Research Note. 2017. Magic quadrant for business intelligence and analytics platforms.
- Harrison, Walter T., Charles T. Horngren, and Charles W. Thomas. 2010. *Financial Accounting*, 8th *edition*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Hepner, Michelle, and Warren Dickson. 2013. "The value of ERP curriculum integration: Perspectives from the research." *Journal of Information Systems Education*, 24, no.4: 309 – 326.
- Jones, Nancy and James Mensching. Accounting information systems using GBI (North America Only). Version 1.0. June 2013. Available to SAP UA member schools through SAP University Alliance Learning Hub Accounting curriculum.
- Khoury, Sam, Lisa Rich, and Kouroush Jenab. 2015. "Obstacles to the integration of SAP training in academic programs." *Strategic Management Quarterly*, 3, no. 1: 95-115.

- Kohers, Gerald. 2015. "SAP and the introductory Management Information Systems Course." *Academy of Educational Leadership Journal*, 19, no. 1: 65-70.
- Le Duc, Michael. 2014. "Critical success factors for implementing ERP in the curriculum of university business education: A case study." *Proceedings of the European Conference on Information & Evaluation*, 128-135.
- Léger, Pierre-Majorique, Timothy P. Cronan, Patrick Charland, Robert Pellerin, Gilbert Babin, and Jacques Robert. 2012. "Authentic OM problem-solving in an ERP context." *International Journal of Operations & Production Management*, 32, no. 12: 1375-1394.
- Léger Pierre-Majorique, Jacques Robert, Gilbert Babin, Derek Lyle, Timothy P. Cronan, and Patrick Charland. 2010. "ERP simulation game: A distribution game to teach the value of integrated systems." *Developments in Business Simulation and Experiential Learning*, 37: 329-334.
- Léger, Pierre-Majorique, Jacques Robert, and Gilbert Babin. 2013. *ERP Simulation Game: Changing the way we teach and learn about enterprise systems – Teaching Notes for instructors using ERPSim.* Montreal, Canada: HEC Montreal - ERPSim Lab.
- Mandal, Purnendu and Alicen Flosi. 2012. "Horizontal integration of courses through SAP: implementation in a business school." *International Journal of Business Information Systems*, 9, no. 3: 343-355.
- Pathways Commission. 2012. "Charting a national strategy for the next generation of accountants." *Pathways Commission Report*. (New York, NY: American Accounting Association, July 1) <u>http://commons.aaahq.org/posts/a3470e7ffa</u>.
- Pathways Commission. 2015. "Implementing the recommendations of the Pathways Commission: Year 3." *Pathways Commission Report*. (New York, NY: American Accounting Association, August) <u>http://www2.aaahq.org/AAACommons/Pathways2015Report.pdf</u>.
- PwC. 2015a. "Data driven: What students need to succeed in a rapidly changing business world." (New York, NY: PwC firm publication, February) <u>http://www.pwc.com/us/en/faculty-resource/data-driven.html</u>.
- PwC. 2015b. "Point of View: The evolution of auditors how skillsets are changing." (New York, NY: PwC firm publication, October) <u>http://www.pwc.com/us/en/cfodirect/publications/point-of-view/evolution-of-auditor-skills-technology-accounting.html.</u>
- Rienzo, Thomas and Bernard Han. 2011. "Does ERP hands-on experience help students learning business process concepts?" *Decision Sciences Journal of Innovative Education*, 9, no. 2: 177-207.
- Riley, Richard A., Ernest R. Cadotte, Leff Bonney, and Christelle MacGuire. 2013. "Using a business simulation to enhance accounting education." *Issues in Accounting Education*, 28, no. 4: 801-822.

- SAP University Alliance. n.d. SAP University Alliance: Shaping the future of education. <u>https://www.sap.com/training-certification/university-alliances.learning-center.html</u> (March 3, 2017).
- SAP University Alliance Curriculum. 2016. Introduction to ERP using Global Bike Incorporated. Version 3.0 (Multiple authors). July 2016. Available to SAP UA member schools through SAP University Alliance Learning Hub – Business Process curriculum.
- Shulman, Lee S. 2005. "Signature pedagogies in the professions." Daedalus, 134, no. 3: 52-59.
- Simkin, Mark G., Jacob M. Rose, and Carolyn S. Norman. 2015. *Core concepts of accounting information systems*, 13th edition. Hoboken, NJ: Wiley.
- University of St. Thomas. 2017. Mission, Convictions, and Vision Statement. <u>http://www.stthomas.edu/mission/</u> (May 29, 2017).
- Watson, E.F. 2001. "The SAP Education Alliance: Preparing students for an e-business world." *Panel presentation at the DSI Annual Meeting*, San Francisco: CA, November 17.
- Watson, Marcia Weidenmier, Bonnie K. Klamm, Joann Segovia, and Mark W. Lehman. 2016. "Enterprise system case using Microsoft Dynamics GP via DynamicsCloud." *Journal of Accounting Education*, 37, 67-92.
- Yin, Robert K. 2013. Case study research: Design and methods, 5th edition. New York, NY: Sage Publications.