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Implementation of AACSB Standard A7: A Strategy for Limited Resources

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Abstract

We survey 2010-2016 accounting graduates of a teaching-focused institution to determine the data related tasks faced by accounting professionals. The results of the survey will be used to implement curricular changes consistent with AACSB Standard A7 (Information Technology Skills and Knowledge for Accounting Graduates). We find that Excel, and other readily available resources satisfy our respondents and can serve as the basis for compliance.

Introduction

The Association to Advance Collegiate Schools of Business International (AACSB) is the leading accreditation body for business schools and additionally provides separate accreditation for accounting programs. AACSB accreditation serves as the foundation for assessment, curriculum, and ultimately the quality of these programs. In 2013, the AACSB issued their revised standards for accounting accreditation which included the implementation of Standard A7 related to technology and data analytics. Compliance with this and other accounting accreditation standards is critical to the success of accounting programs, however compliance by teaching-focused institutions may become challenging when human capital and budgetary resources are limited. These constraints are important to consider as continued certification for these types of schools influences student and employer choice in a competitive market (Kim et al. 1996 and Gaharan et al. 2014). While the AACSB encourages the flexibility of meeting standard compliance within the realm of the institution's mission (AACSB 2016), it is still relatively unclear how non-research-intensive universities might use this flexibility to most appropriately meet the potentially costly demands of Standard A7. This study uses a three-step approach to address this question and assist in Standard A7 implementation for these types of M1 universities with resource constraints in mind: a survey is conducted, results reported and a review of low-cost resources for faculty along with recommendations is provided.[1]

There are a variety of options for Standard A7 implementation including creating data management courses, purchasing large data sets, and licensing data processing and analysis software. While such strategies might be effective, the related cost is likely prohibitive for institutions with limited resources. Results of our survey of recent accounting alumni reveal that the majority of recent graduates analyze and process data on a large scale, using Excel, audit software like IDEA and proprietary software. The survey results suggest that use of such tools readily available to institutions at minimal additional costs meet the requirements of Standard A7 and are optimal in

[1] As classified by The Carnegie Classification of Institutions of Higher Education (Indiana University Center for Postsecondary Research 2015). The full title of the M1 classification category is "Master's Colleges and Universities – Larger" which includes programs with at least 50 master's degrees and fewer than 20 doctoral degrees during the update year.

preparing graduates to enter the workforce. Review of the literature provides published case studies, textbooks that incorporate data technology and other instructional resources to introduce students to the concept of using data to make business decisions.

Background

AACSB International and its Impact

The Association to Advance Collegiate Schools of Business International (AACSB) was founded in 1916 and started granting separate accreditation for accounting programs in 1981 (Gaharan et al. 2007). As of 2017 there are 789 accredited business schools and 186 separately accredited accounting programs (AACSB, June 3, 2017). The mission of AACSB is "to foster engagement, accelerate innovation, and amplify impact in business education." (AACSB 2016 p. 3). The impact of the AACSB accreditation on accounting programs is wide-ranging as evidenced in the literature (Kim et al. 1996; Bunker et al. 2014; Gaharan et al. 2007).

In 1991, the AACSB revised its accreditation standards for both business schools and accounting programs to allow more flexibility in implementing accreditation standards within the bounds of the institution's stated mission (Gaharan et al. 2007). Consistent with this practice, the organization continuously reviews its standards "to improve relevance, maintain currency, and increase value" (AACSB 2016, p. 3). The most recent revision of those standards occurred in 2013 and introduced the requirements of Standard A7 which encourages the integration of data analytics and related technology into the accounting curriculum. The potential impact of this standard and possible challenges to those with limited resources is discussed in the following sections.

Standard A7 – Accounting Program Incorporation of "Big Data"

The issue of technology and data analytics in the accounting curriculum arguably goes back to the Pathways Commission Report of 2012. The Commission sponsored by the American Institute of Certified Public Accountants (AICPA) and the American Accounting Association (AAA) was composed of over 50 academics and practitioners who were charged with compiling a guide of objectives for the future of accounting education along with recommendations for implementation of those objectives (Pathways 2012). The members of the commission represented diverse stakeholders, ranging from representatives of the big four accounting firms to those from research-intensive institutions (R1) as described by Carnegie standards. The Commission's report stressed the following:

> *"technology's rapid development introduces new opportunities and challenges. Enhanced technological skills are increasingly important for businesses' success and, therefore, for future accountants." (Pathways 2012, p. 133)*

The AACSB's working group tasked with evaluating potential changes to accreditation standards concurrently observed a change in the landscape of data analytics and technology impacting various accounting stakeholders (AACSB 2014). Standard A7 is the organization's effort to address these factors. The Standard provides the following guidance to programs with separate accounting accreditation:

> *"Consistent with mission, expected outcomes and supporting strategies, accounting degree programs include learning experiences that develop skills and knowledge related to the integration of information technology in accounting and business. Included in these learning experiences is the development of skills and knowledge related to data creation, data sharing, data analytics, data mining, data reporting, and storage within and across organizations." (AACSB 2016, p. 30)*

The incorporation of Standard A7 is designed to help students be better prepared for the changing environment.

Potential Challenges of Standard A7 Implementation

Administrators of separately accredited accounting programs report only minimal increases in funding and increased demand on the time and effort of existing faculty (Gaharan et al. 2007). Constraints on faculty time, financial resources, and physical space must be considered when implementing standards to maintain AACSB accreditation

(Barsky et al. 2003). Such constraints have the potential to be magnified for smaller non-research-intensive universities that already have limited resources and concerns about accreditation. A survey of accounting administrators reveals that smaller institutions find loss of accreditation to be potentially more damaging than larger institutions. In addition, accounting programs with a teaching focused mission felt more strongly that loss of accreditation would reflect negatively on their program (Bitters 2014).

Faculty at these same institutions often have higher teaching loads and hence less time to make curricular changes or to add new dimensions to their existing course load (Greenberg and Moore 2013). Further, the datasets necessary for large scale data analytics projects are often costly, but even when free, may require large server capacity by institutions whose servers are not so designed. Big data sets also require sophisticated software programs to manipulate them (e.g. SAP, Oracle, etc.). These software programs compound the server space issue and increase costs. In addition, hiring new faculty dedicated to technology management is expensive as accounting faculty is among the highest paid in business schools (AACSB 2017).

The significant impact that big data and technology will have on the accounting profession and academia has been well discussed (Warren et al. 2015; Vasarhelyi et al. 2015; Janvrin and Watson 2017). As noted previously, the AACSB issued Standard A7 to ensure that institutions with separate accounting accreditation are adequately training students to be comfortable interacting with the world of 'big data'. Although the standard is well intentioned, there is confusion as to the best strategy for its' implementation. To address this concern, AACSB issued a white paper in the hopes of providing general guidance on how to incorporate data analytics and technology into the accounting curriculum (AACSB 2014). The suggested approach is an interdisciplinary incorporation of statistics, data management, and analytics. The white paper makes clear that the focus of the standard should not be on information systems alone but rather across the curriculum.

Although the guidance offered by the white paper is informative, the AACSB stopped short of prescribing specific strategies for institutions. In fact, the standard itself makes clear that compliance with AACSB standards will be evaluated with the mission of the individual institution in mind:

> *One of the guiding principles of AACSB accreditation is the acceptance, and even encouragement, of diverse paths to achieving high quality in management and accounting education. Accreditation decisions are derived through a process that relies on the professional judgment of peers who conduct reviews that are guided by the mission of the business school or accounting academic unit. (AACSB 2016 pg.4)*

The white paper reiterated the importance of a mission focused implementation strategy, while cautioning that institutions must still address the expectations of the standard:

> *In all cases, curricula developments must be driven by the mission and strategic management plan of the accounting academic unit. However, it is important to note that the spirit and intent of Standard A7 is that all AACSB separately accredited accounting academic units must address the expectations of the standard regardless of the mission. (AACSB 2014 pg. 2)*

While students' professional preparedness is likely represented in the mission of most business schools, the resources and strategies for providing that preparedness often vary by institution. By not prescribing how implementation should occur, the AACSB has provided flexibility for schools to develop strategies that best fit their environments. However, even after issuance of the AACSB white paper, it remains unclear how best to use this flexibility to meet the "spirit and intent" of the standard which calls for a robust implementation throughout the curriculum. This lack of clarity presents the following research question:

> ***RQ**: How can institutions with limited resources use the flexibility provided by the AACSB to meet the requirements of Standard A7?*

To address this question, we first set out to determine the needs and expectations of the principal stakeholders in their professional pursuits in this 'big data' world. Once the needs are determined recommendations can be made as to how to meet those needs based on available resources. We survey alumni of a teaching focused public institution of higher education which is AACSB accredited and which maintains separate accounting accreditation. The alumni surveyed are all working accounting professionals. Through analysis of these survey results we hope to be able to identify what do these accounting professionals need to know about big data and what would they have liked to have known as they face working in this changing business environment. These results will serve as the foundation for how a limited resource institution can move forward to comply with Standard A7. What follows is a description of our methodology, particulars on the survey, results of that survey and finally curricular recommendations for limited resource institutions.

Methodology

To investigate the most appropriate and cost-effective way to implement Standard A7 throughout accounting curriculum when resources are constrained, we utilize a three-step approach. First, we conduct a survey of recent accounting graduates in the professional community to determine their use of and familiarity with large scale data. This was driven in part by, the AACSB outlining an expectation that accredited institutions incorporate the perspectives of their stakeholders including alumni in their implementation of standard A7. Next, we review the Standard A7 curriculum implementation literature to assess the suggested strategies for feasibility in low-resource environments. Finally, we recommend an outlined cost-effective approach to Standard A7 implementation for limited resource institutions.

Survey

Our first step was to survey institution alumni to determine their specific needs in technology and data management and their satisfaction with how well their coursework prepared them for the workforce. In addition to questions specifically related to data analytics and technology, other questions designed to gauge interaction with big data in the workplace, general areas in which participants wished they had more instruction, and a demographic questionnaire were also included. Prior to dissemination, the survey instrument was reviewed by an accounting department chair, business (accounting) faculty and staff of the university's office of institutional effectiveness. The final version of the survey instrument was disseminated via email to 483 undergraduate and graduate accounting student alumni of an M1 university in the southeast using Qualtrics. The survey period was from mid-February through mid-March 2017. Participants in the survey graduated during the years 2010 thru 2016. A total of 117 completed responses were received (24% response rate). On average respondents took 23 minutes to complete the instrument.[2]

Much like the Pathways Commission survey in 2012 served as the basis for recommendations on the education of future generations of accountants (Pathways 2012), these survey results will be used to drive compliance within the confines of the institution's mission and resources. The use of the alumni base as a population is critical as the types of employers and career paths reflected are most representative of the market demographics future graduates will face and thus may provide insight into the best course of action. These recommendations should be of value to similarly situated institutions as they undergo AACSB accreditation.

Demographics

Of the 117 completed responses evaluated for this study, 53 participants were male (45.3%) and 56 (47.9%) female with an average age of 26.56 years.[3,4] As expected, the overwhelming majority of participants have careers in accounting (82 or 70.1%), while the remaining participants had careers in either finance, law, sales or other fields. A wide variety of industries are represented; however, a significant portion of participants are in public accounting (56

[2] Five participants were recorded as taking longer than one day to complete the survey. As these participants were outliers, they were removed from this average calculation.
[3] Note eight participants (6.8%) chose not to provide their gender.
[4] Note 17 participants chose not to report age.

or 47.9%) and 47 participants (40.2%) reported being licensed CPAs. Refer to Table 1 for more detailed demographic information.

Perception of Workforce Preparedness

To determine the effectiveness of the current curriculum at meeting the skill needs of recent graduates, our first question asked participants whether they felt the accounting courses required as part of their undergraduate degree program prepared them to perform well in the workplace. The overwhelming majority of participants responded either "Definitely Yes" (48 or 41%) or "Probably Yes" (51 or 43.6%). However, when questioned further, 67 participants (57.3%) felt there were specific topics that were not offered in their undergraduate coursework that would have better prepared them for the work done since graduation. The topics most mentioned by this group were use of Excel (18 or 26.9%), technical accounting topics (10 or 14.9%), data analytics (9 or 13.4%), and "real-world" audit topics (9 or 13.4%). Refer to Table 2 for further details. Although it appears that in general, participants felt the accounting curriculum served them well, there are several areas in which students felt they could have received additional instruction. Further, all participants were asked which skills they felt current students might be lacking as they enter the workforce, and only 17 (14.5%) specifically referenced data analytics. Again, Excel was mentioned most frequently with 35 (29.9%) of participants as a beneficial skill. Also mentioned was the need to better develop soft-skills such as communication, time management, and working as a team (10 or 8.5%).

Participant experience with "big data"

Big Data Defined. To gain an understanding of how familiar participants were with the term "big data" they were asked to define the term in their own words. Forty-one or 35% of participants indicated they were not at all familiar with the term big data. The responses of the remaining 76 (65%) have been categorized into broad categories (See Table 3)[5]. While there is no one generally accepted definition of the term "big data" in the literature, those participants familiar with the term agreed it was the amount of data. Seventy-two of 76 (or 94.7%) of those participants offered a definition indicating big data refers to a large volume of data. In addition, many of these participants stated big data must be analyzed in order to be meaningful (39 of 76 or 51.3%), is generated from technology (15 of 76 or 19.7%) or is too difficult to interpret without the use of software (7 of 76 or 9.2%): clearly responses one and three when combined lead to the conclusion that software manipulation is required when dealing with big data.

Processing Data. Beyond just assessing their understanding of the term, all participants were asked if their employment required them to *process* (i.e. clean, summarize, etc.) data on a large scale. Although participants did not agree on a singular idea about what the term big data means, many of them report processing it (See Table 4, *ProcessData*)[6]. Most participants (85 of 117 or 72.6%) reported processing data at least some of the time as part of their employment. Fifty-eight (49.5%) stated that about half of their required tasks involve processing data on a large scale. These participants report processing to review client data (39 or 45.9%), transaction level detail (23 or 27.1%), and general ledger data (11 or 12.9%). For these participants, Excel (66 or 77.6%), IDEA (21 or 24.7%), and firm proprietary software (15 or 17.6%) were the most popular tools. For the 32 participants who indicated they "never" process data on a large scale, only six of them (18.8%) believed it was at least somewhat likely they would have to do so in the future. Although not all participants reported having experience in this area, the overwhelming majority of participants believed that current students would be better prepared for the workforce if they had more training related to processing data (101 or 86.3%) (*ProcessTrainStu*).

Analyzing Data. Results here closely mirrored those of the processing data query. Participants were also asked whether their job responsibilities include *analyzing* data on a large scale (See Table 5, *AnalyzeData*). Most

[5] Not tabulated were the results of a crosstabs analysis which showed that of those not at all familiar with big data, 43.9% were in public accounting and 56.1% were in industry.

[6] There was no significant difference in the responses of those in public accounting and those in industry regarding the job requirement to process data (p=0.487). In addition, there's no significant difference in the potential to process data in the future between those in public accounting and those in industry (p=0.058).

participants (86 of 117 or 73.5%) analyze large scale data as part of their employment[7]. Sixty-seven (56.2%) stated that about half of their required tasks involve analyzing data on a large scale. These participants report analyzing data to evaluate client data (40 or 46.5%), transaction level detail (13 or 15.1%), and general ledger data (15 or 17.4%). For these participants, Excel (70 or 81.4%), IDEA (21 or 24.7%), and firm proprietary software (8 or 9.3%) were the most popular tools. For the 31 participants who indicated they "never" process data on a large scale, eleven of them (35.5%) believed it was at least somewhat likely they would have to do so in the future. Although not all participants reported having experience in this area, the majority of participants believed that current students would be better prepared for the workforce if they had more training in analyzing data (106 or 90.6%) (*AnalyzeTrainStu).*

Additional Analysis

It is possible that students graduating more recently would have a different view of big data than those graduating earlier in our sample period. It is also possible that those students with more overall work experience would have varying views on this topic. To maintain anonymity, we did not ask participants to indicate during which year in the sample period they graduated. Students in this institution's undergraduate and graduate accounting programs are typically traditional students (entering undergraduate directly from high school and the graduate program directly from an undergraduate program). As such, we use age and years of experience as proxies for the number of years the participant is removed from these programs. To determine what possible affect age and experience might have on our primary variables of interest, we examine the relevant Pearson correlations (see Table 6). There is no significant correlation between age and experience with any of the other variables discussed in our survey and therefore we performed no further analysis in this area. This result is not completely surprising considering the pervasiveness of big data in the accounting profession and world of business in general.

Summary of Survey Results

The increased use of technology in business and other transactions has transformed human interaction in many ways but most significantly for accountants through the creation of 'big data'. The recent surge in the use of the term big data (Gandomi and Haider 2015), coupled with the fact that the term means different things in different environments (Vasarhelyi et al. 2015) makes it difficult to provide a singular definition. Most commonly, big data is defined by its characteristics through the framework of the Three Vs: High Volume, High Variety, and High Velocity (Laney 2001). Although there is no widely accepted definition, there does seem to be agreement that the accounting profession is being changed by this surge in information. Traditional record keeping and analysis can no longer keep up with knowledge-based analysis (Vasarhelyi et al. 2015). More powerful technology will not only allow for the creation of more data but for the opportunity to mine that data for valuable knowledge and that opportunity/responsibility is likely to lie at the feet of accountants.

Overall, most alumni participants surveyed indicated they either processed or analyzed data on a large scale, most of it client-related data, transactional level detail, or general ledger information. However, many were not able to provide a definition for the term "big data" indicating that part of the effort in implementing a more data and technology curriculum involves informing students about the topic in general. In addition, these findings indicate that beyond the academic push for training in this area, recent alumni agree it would add value to their professional work. It should be noted that there were no significant differences noted in the primary dependent variables discussed (ProcessData and AnalyzeData) between those in public accounting and those in other fields. Interestingly, when asked in which skills they would like more training or would recommend that current students receive more training, Excel was the most frequently mentioned. Although at times "big-data" is presumed to require special software to interpret, Excel and other tools most readily available are used frequently and such tools are likely to provide a solid starting point for Standard A7 implementation. The following section discusses how universities with similar alumni composition might be able to meet the challenge of preparing students for the world of "big data" when resources are constrained.

[7] There was no significant difference in the responses of those in public accounting and those in industry regarding the job requirement to analyze data (p=0.280). In addition, there's no significant difference in the potential to analyze data in the future between those in public accounting and those in industry (p=0.183).

It should be noted that this survey is not without limitations. While our responses provide a rich picture of what recent accounting graduates experience related to big data, the results are limited: they represent one teaching-focused university and cover only alumni who have graduated relatively recently (2010-2016). These parameters may exclude graduates with more experience and those in upper level management tasked with developing company strategies related to big data. In addition, with a response rate of 24% and little information about those who did not respond, it is difficult to hypothesize how our survey results would have been changed by the participation of those who did not respond.

Big data Curriculum Review and Low-Cost Solutions

Integrating data analysis into the accounting curriculum stems from the desire of the AACSB and other groups to improve student long-term career readiness. Lawson et al. (2014) outline criticism of past curriculum focus on entry-level requirements that specifically address the readiness of those entering public accounting. These authors suggest data analytics is a solution to creating more well-rounded graduates with skills allowing them to make a broader contribution outside of the accounting context. To this end, Sledginowski et al. (2017) recently offered an in-depth analysis of how big data and its use might be integrated throughout the accounting curriculum. The authors stress the importance of keeping faculty competencies and available resources in mind. Our survey results suggest that use of Excel and audit software tools such as IDEA are most immediately relevant to the needs of recent graduates as that is likely what will be faced by students in a similar marketplace. We evaluate the curriculum integration suggestions provided by Sledginowski et al. (2017) and other resources to outline a cost-efficient approach to integrating data technology into the accounting curriculum for the specific courses discussed below.

Financial Accounting

Financial accounting, especially the introductory course, is often occupied by students in a wide variety of majors with a wide variety of interests. As such, integration of data technology in this course should be more of an introduction to the topic and less accounting specific. Such an introduction is helpful considering 35% of survey participants were not able to provide any reasonable definition of the term “big data”. As financial ratio analysis is already something that is commonly covered in introductory accounting courses, using Excel or some other spreadsheet-based software would integrate practice with this tool early in the curriculum. This topic is especially important as this was an area in which survey participants felt more training was necessary. As suggested by Sledginowski et al. (2017), data on various companies can be obtained for free by students on the Security and Exchange Commission (SEC) website ((https://www.sec.gov/dera/data/financial-statement-data-sets.html%20) and multiple exercises can be performed allowing students to interface with Excel.

In addition to the requirement of financial statement filings, the SEC also mandates that financial statement values, including footnotes, for public companies be tagged using XBRL which can be analyzed using tools available as free downloads (Sledginowski et al. 2017). For schools with limited resources, this requirement creates an opportunity for intermediate accounting students to analyze a variety of footnotes for topics related to the more complex areas typically covered in this course (Pensions, Revenue Recognition, Inventory, Property Plant and Equipment, etc.) at little additional cost. Taylor and Dzuranin (2010) offer a no cost introductory XBRL case which familiarizes the student with the data and outlines how to perform analysis in Excel using XBRL information readily available on the SEC’s website. While faculty would have to invest some time in becoming familiar with the analysis tool, such a project should not take any additional time in the course schedule beyond what would be experienced in a financial statement analysis project, a frequent assignment in this type of course.

Audit

The recent focus on data analytics has had a significant impact on the field of auditing as a more data driven approach may significantly change the way audits are performed. Murphy and Tysiac (2015) outline many of these potential changes, including audit testing which focuses on complete sets of data rather than samples, and using data analysis to complete risk assessments during the planning process. Enget et al. (2017) offer a case study focusing on analyzing client data in which students first plan client journal entry testing procedures for a fictional company and later analyze the summary of testing data provided by the firm’s data analytics specialists. The case provides an

opportunity for students to see how meaning can be drawn from the vast amount of journal entry data available for a company. The case includes general background information on the use of Big Data during the financial statement audit, reiterating topics discussed in-class and in the audit text. Such readily available case studies provide a low-cost option to introduce data analysis giving students the opportunity to analyze client data which was a significant area of focus for our survey participants. Additionally, Ernst & Young offers a variety of multi-part case studies (Ernst & Young Foundation 2017). Using these resources, students are required to use tools like Excel, Tableau, and Access to process and analyze data. These resources include detailed instructional videos which significantly reduce the amount of prep work required to integrate these cases into the classroom. KPMG offers similar resources albeit with less breadth of coverage (KPMG 2017).

Textbook selection is another opportunity to integrate big data into the audit curriculum with minimal additional cost to students. With the imminent changes to the audit process and Standard A7 in mind, textbooks like *Auditing & Assurance Services* (Louwers et al. 2017) have made significant changes to include assignments which incorporate the use of IDEA. Survey participants also indicated that they utilize this and other such data visualization tools during audits. Purchase of Louwers et al. (2017) includes the cost of the software and topics are integrated throughout the text creating no additional cost to the department or the student. While faculty will have to spend some time familiarizing themselves with the software, Caseware, the creators of IDEA provide a free detailed workbook which would assist in that effort. Case studies and textbook IDEA assignments would have minimal disruption to course schedules as they can replace previously assigned homework and cases which may be outdated or which do not include data considerations.

Accounting Information Systems (AIS)

AIS is the course that seems the most natural fit for integrating data analysis, however the AACSB white paper on Standard A7 makes clear that the discussion of data and data analytics in the AIS course should complement other curriculum changes rather than be the sole focus of change (AACSB 2014). As many of the other courses discussed here focus on data analysis, the AIS course offers the opportunity to complement that knowledge base with more focus on how the raw data is processed and background information on the overall concept of data technology. Enterprise Resource Planning (ERP) systems are typically one of the most significant investments a company will undertake thus making practice with tools like SAP or Oracle extremely beneficial to students. However, licensure for this type of software is costly and learning curve for faculty may be steep. Students can begin understanding databases and the processing of data using Microsoft Excel and Access both of which are readily available on most campuses. Such tools may be used to discuss with and demonstrate to students the importance of data cleansing prior to analysis. Survey participants listed Excel as a widely used tool for processing and analyzing large datasets possibly because it is readily available on office systems. The AIS schedule should allow for a more in-depth review of the tools and websites like Alison.com offer training on the use of Excel regression analysis. The same website also offers introductory training on data analytics in general. Self-paced assignments can be used on their own or as a supplement to in-class instruction using common AIS textbooks such as Romney and Steinbart (2015). In addition, instructors can utilize available access case studies like Nikitkov and Sainty (2008). This case allows students to use Access to implement the information system for a recently merged dental practice. In addition, faculty can refer to resources offered by public accounting firms such as KPMG which offer a variety of skill development tools for Excel like the use of pivot tables, conditional formatting, and LOOKUP functions. These low-cost solutions provide students the ability to become more familiar with using data to make business decisions, but not at great expense to the institution or faculty.

Managerial and Cost Accounting

Managerial and Cost accounting courses readily lend themselves to discussion of data analysis as managerial and cost accounting typically focus on management decision making regarding budgeting and product costing. Introduction of data analytics in these courses would include introducing more large-scale data tools which would be used to make these decisions. Consistent with the results of our surveyed alumni, Bradbard et al. (2014) find that management accountants rely heavily on spreadsheet software (e.g. Excel) to assist in their decision-making. In addition to the introduction of Excel in the AIS course, faculty could use the cost and managerial courses to provide students the opportunity to gain experience in practical applications with managerial data. To that end, Convery and

Swaney (2012) offer a case study with the express purpose of focusing on data analysis and development of related Excel skills. Students would be responsible for using the tool to practice budgeting, forecasting and to generate supporting schedules for analysis. To better assist instructors, the authors offer detailed strategies on how to integrate the case into the course.

Our survey participants indicated use of ERP systems such as SAP and Oracle for processing and analyzing large amounts of data. As noted previously, the cost of the full versions of this type of software may not fit within the resource constraints of some institutions. An alternative approach would be to incorporate into the curriculum an Activity-Based-Costing (ABC) case study to provide students with relevant experience. Blocher et al. (2009) provide a case focused on using OROS Quick®, a demo version of an ABC software offered by SAP. Students (and instructors) have access to complete a software tutorial after which, students will use the software to analyze SG&A costs for a fictional company. These or other case studies could take the place of homework assignments typically required and introduce students to the use of data for managerial and costing decisions without demanding a significant increase in prep-time for faculty or use of other departmental resources.

Taxation

As noted by Sledginowski et al. (2017), there are limited instructional resources available to provide students with practical application of big data in the taxation curriculum and survey participants did not specifically mention tax related topics when asked about data processing and analysis. However, instructors can take the opportunity to discuss with students how data is changing the way tax authorities determine company compliance and how companies assess risk and make tax planning decisions (Ernst & Young 2016). Rather than focusing on data from completed transactions, it is expected that tax data analytics will be used to help companies focus on gaining insight into how business decisions, like employee travel or buying and selling assets, might impact a company's tax position in the future (Deloitte 2016). These and other relevant discussions will allow students to understand how "big data" will continue to impact the tax profession. Beyond these discussions, the XBRL topics introduced in AIS courses will allow students to understand how they might utilize the tagged tax information in the financial statements across a variety of years and companies.

Business Law

Other courses discussed focus primarily on processing and analyzing data, however the law course can assist in providing background information for students on issues related to the creation, storage and use of data and the rights and obligations of all parties involved. It is important students be made aware of the nature of their responsibilities and potential liabilities as generators, custodians and users of data which often contains confidential information. As accountants, students must meet professional standards of responsibility and these are ever changing as the law on data privacy evolves. This type of course gives space to cover the Stored Communications Act, Public Law 99-503, 18 U.S. Code Sections 2701 et seq (1986) and current challenges to that law. The new CLOUD legislation (Clarifying Lawful Overseas Use of Data Act, 2018) which has been passed as part of tax reform can also be discussed here to demonstrate the ever-changing legal responsibilities that accountants may have with data. Legal standards of civil liability for invasion of privacy and standards of negligence are also covered in these courses thus giving the accounting student a sense of the expected guidelines of how to treat data in the workplace. Issues of privacy, protection and ethics are typically covered in law courses and therefore addition of data topics should not create a strain on the course schedule or faculty resources[8].

Conclusions

Standard A7's focus on the use of data technology will significantly impact separately accredited accounting programs, especially those with limited resources including restrictions on faculty time, financial resources, and space. With no more than broad guidance from the AACSB as to how the standard should best be implemented,

[8] As of May 25, 2018, the European Union's General Data Protection Regulation went into effect: how this regulation will impact big data and those who deal in, and with it, will be critical over the next few years. For a general overview see: https://www.eugdpr.org, last visited June 12, 2018.

programs are left to determine how best to implement the standard in a way that fits their mission and resources while still satisfying the AACSB's requirements.

The survey of recent accounting alumni presented here demonstrates that many accounting professionals process or analyze data and that even graduates from regional institutions are likely to interact with large data sets in their careers. In addition, consistent with the AACSB, an even larger majority of those former students believe it important that current students receive training in the area of data technology. The survey results also indicate, that many of the programs used to analyze and process data on a large scale were programs that can be incorporated at low cost to the institution and in some instances, are already available (Excel and IDEA). By incorporating the use of these programs strategically throughout curriculum, in combination with focused case studies and textbooks that integrate data technology, students can be introduced to the idea of working with and making meaning of data without the institution incurring significant additional costs.

The implementation approach by course allows similar M1 universities to meet the immediate requirements of Standard A7 in a way that will benefit students in the job market they will likely face. In addition, the approach of using strategic add-ons to the curriculum limits the pressure on already constrained resources of faculty time, financial resources needed to purchase additional technology resources, and classroom space. Using the feedback of targeted alumni allows an institution to strategize in the implementation of standard A7 as this feedback is most likely to reflect the type of experience graduates will face in the university's region. Such a targeted approach can be useful to accounting programs with limited resources at similarly sized M1 institutions.

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Table 1
Demographic Information

Completion time - Average	23 minutes[9]	
Experience – Average	3.88 years	
Age – Average	26.56 years[10]	
Gender	53 (45.3%)	Male
	56 (47.9%)	Female
	8 (6.8%)	No response
Career Field	82 (70.1%)	Accounting
	7 (6%)	Finance
	28 (23.9%)	Other

Industry

#	%	
56	47.9%	Public accounting
9	7.7%	Financial services
5	4.3%	Technology
5	4.3%	Nonprofit / Governmental
5	4.3%	Manufacturing
4	3.4%	Healthcare
3	2.6%	Legal
3	2.6%	Consulting
2	1.7%	Transportation
2	1.7%	Investments
2	1.7%	Food and beverage
2	1.7%	Media entertainment
2	1.7%	Tax
17	14.5%	Other
117	**100%**	**Total**

Are you a licensed CPA?	47 (40.2%)	Yes
	70 (49.8%)	No

[9] 5 participants were recorded as taking longer than one day to complete the survey. As these participants were outliers, they were removed from this average calculation.
[10] Seventeen (17) participants chose not to report age.

Table 2

Workforce Preparedness

Do you feel the accounting courses you received as part of your undergraduate degree prepared you to perform well in the workplace?

Response	#	%
Definitely not	2	1.7%
Probably not	5	4.3%
Might or might not	11	9.4%
Probably yes	51	43.6%
Definitely yes	48	41.0%
Totals	**117**	**100%**

Are there specific topics you were not offered during your undergraduate coursework you feel would have better prepared you for the work you have done since graduation?

Response	#	%
Yes	67	57.3%
No	50	42.7%
Totals	**117**	**100%**

Please list the specific topics you felt would have been beneficial below:

(67 respondents provided additional detail, with most providing more than one suggestion)

Topic	#	% of 67
Excel	18	26.9%
Technical accounting topics	10	14.9%
Data analytics	9	13.4%
Real-world audit topics	9	13.4%
Advanced tax topics	6	9.0%
Software (Oracle, SAP, etc)	6	9.0%
Governmental accounting	6	9.0%
Soft Skills (drafting emails, meetings)	5	7.5%
Quickbooks	4	6.0%
CPA prep	3	4.5%
Audit software (IDEA, Tableau, ACL)	3	4.5%
Account research	2	3.0%
Systems	2	3.0%
Tax preparation	2	3.0%
Other	3	4.5%

Table 2

Workforce preparedness (*continued)*

Please describe any skill and/or training you believe students may be lacking when entering the workplace which could be better emphasized in the accounting curriculum. If nothing, please put "no response" in the box below.

Skill needing more emphasis	#	% of 117
Excel	35	29.9%
Data analytics	17	14.5%
Soft skills (communication, professionalism)	10	8.5%
Accounting systems	7	6.0%
Real world accounting simulations	5	4.3%
Programming / coding	4	3.4%
Quickbooks	3	2.6%
CPA prep	3	2.6%
Critical thinking	3	2.6%
Career planning	2	1.7%
SAP	2	1.7%
Tax return preparation	2	1.7%
Tax software	2	1.7%
Other	13	11.1%
No response	25	21.4%

Table 3

Big Data Definitions

What is your definition of the term "Big Data"? If you do not have a working definition of this term, simply type “no response” in the space below:

(76 participants provided a definition, 41 provided no response. This question was free response; however, I have categorized each response into the following general categories)

Topic	**#**	**% of 76**
Large volumes of data analyzed to make meaning	39	51.3%
Large volumes of data generated from technology	15	19.7%
Large volumes of data	11	14.5%
Large volumes of data too difficult to interpret without software	7	9.2%
Information analyzed in performing audits	2	2.6%
Databases of information	1	1.3%
All data representing a population	1	1.3%
Total	**76**	**100%**

Table 4
Processing Data

Does your job require you to PROCESS (i.e. clean, summarize, etc.) data on a large scale and if so, how often? In this context, large scale data refers to data sets requiring the use of special programming to make meaning of the information (*ProcessData)*.

Response	#	**%**
Never	32	27.4%
Sometimes	27	23.1%
About half the time	10	8.6%
Most of the time	25	21.4%
Always	23	19.7%
Total	**117**	**100%**

Please describe what types of data you PROCESS?

(Only answered by the 85 respondents who stated they at least "sometimes" process data on a large scale)

Type of data processed	#	**% of 85**
Client data	39	45.9%
Transaction level detail	23	27.1%
General ledger data	11	12.9%
Loan data	2	2.4%
Other	6	7.1%
No response	4	4.7%
Total	**85**	**100%**

Table 4

Processing Data (*continued)*

Please describe what types of software/tools you use to PROCESS this type of data?
(Only answered by the 85 respondents who stated they at least "sometimes" process data on a large scale. Some respondents provided more than one software)

Software used to process data	#	% of 85
Excel	66	77.6%
IDEA	21	24.7%
Proprietary software	15	17.6%
Access	9	10.6%
SAP	6	7.1%
SQL	5	5.9%
Oracle	4	4.7%
Tableau	4	4.7%
Quickbooks	3	3.5%
ACL	2	2.4%
Sage	2	2.4%
Blackbaud software	2	2.4%
No response	5	5.9%
Other	10	11.8%

You responded that you do not PROCESS (i.e. clean, summarize, etc.) large scale data. Do you anticipate having to do so in the future?
(Only answered by the 32 respondents who stated they "Never" process data on a large scale)

Response	#	% of 32
Extremely unlikely	14	43.8%
Somewhat unlikely	5	15.6%
Neither likely nor unlikely	7	21.9%
Somewhat likely	4	12.5%
Extremely likely	2	6.3%
Total	**32**	**100%**

Do you believe current students would be better prepared for the workplace if they received more training on how to PROCESS (i.e. clean, summarize, etc.) large data sets (*ProcessTrainStu)*?

Response	#	%
Definitely not	0	0.0%
Probably not	4	3.4%
Might or might not	12	10.3%
Probably yes	47	40.2%
Definitely yes	54	46.2%
Totals	**117**	**100%**

Table 5
Analyzing Data

Does your job require you to ANALYZE (i.e. make inferences from, interpret, etc.) data on a large scale and if so, how frequently? In this context, large scale data refers to data sets requiring the use of special programming to make meaning of the information (*AnalyzeData)*.

Response	#	%
Never	31	26.5%
Sometimes	19	16.2%
About half the time	15	12.8%
Most of the time	27	23.1%
Always	25	21.4%
Total	**117**	**100%**

Please describe what types of data you ANALYZE?
(Only answered by the 86 respondents who stated they at least "sometimes" process data on a large scale)

Type of data analyzed	#	**% of 86**
Client data	40	46.5%
Transaction level detail	13	15.1%
General ledger data	15	17.4%
Contracts	2	2.3%
Insurance data	2	2.3%
Budget data	5	5.8%
Other	6	7.0%
No response	3	3.5%
Total	**86**	**100%**

Table 5

Analyzing Data (*continued*)

Please describe what types of software/tools you use to ANALYZE data?
(Only answered by the 86 respondents who stated they at least "sometimes" process data on a large scale. Some respondents provided more than one response.)

Software used to analyze data	#	% of 86
Excel	70	81.4%
IDEA	15	17.4%
Proprietary software	8	9.3%
Quickbooks	6	7.0%
Access	5	5.8%
Tableau	5	5.8%
SAP	4	4.7%
No response	4	4.7%
Other	11	12.8%

You responded that you do not ANALYZE large scale data. Do you anticipate having to do so in the future?
(Only answered by the 31 respondents who stated they "Never" process data on a large scale)

Response	#	% of 31
Extremely unlikely	5	16.1%
Somewhat unlikely	9	29.0%
Neither likely nor unlikely	6	19.4%
Somewhat likely	9	29.0%
Extremely likely	2	6.5%
Total	**31**	**100%**

Do you believe current students would be better prepared for the workplace if they received more training on how to ANALYZE large data sets? (*AnalyzeTrainStu*)

Response	#	%
Definitely not	0	0.0%
Probably not	1	0.9%
Might or might not	10	8.5%
Probably yes	46	39.3%
Definitely yes	60	51.3%
Totals	**117**	**100%**

Table 6

		ProcessData	ProcessTrainStu	Analyze	AnalyzeTrainStu	Experience	Age
ProcessData (Participants Processing data)	Pearson Correlation	1	.458**	.633**	.399**	-0.007	-0.038
	Sig. (2-tailed)		0.000	0.000	0.000	0.943	0.708
	N	117	117	117	117	117	100
ProcessTrainStu (Should students be trained to process data)	Pearson Correlation	.458**	1	.302**	.656**	-0.017	-0.004
	Sig. (2-tailed)	0.000		0.001	0.000	0.858	0.966
	N	117	117	117	117	117	100
Analyze (Participants Analyzing data)	Pearson Correlation	.633**	.302**	1	.501**	0.052	0.042
	Sig. (2-tailed)	0.000	0.001		0.000	0.577	0.677
	N	117	117	117	117	117	100
AnalyzeTrainStu (Should students be trained to analyze data)	Pearson Correlation	.399**	.656**	.501**	1	-0.006	0.077
	Sig. (2-tailed)	0.000	0.000	0.000		0.945	0.447
	N	117	117	117	117	117	100
Experience (Participant Experience)	Pearson Correlation	-0.007	-0.017	0.052	-0.006	1	-0.001
	Sig. (2-tailed)	0.943	0.858	0.577	0.945		0.993
	N	117	117	117	117	117	100
Age (Participant Age)	Pearson Correlation	-0.038	-0.004	0.042	0.077	-0.001	1
	Sig. (2-tailed)	0.708	0.966	0.677	0.447	0.993	
	N	100	100	100	100	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation for Key Variables