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# Addressing Skills in an Analytics World: Proposals for the Accounting Department at the University of Arkansas

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# Addressing Skills in an Analytics World
# Proposals for the Accounting Department at the University of Arkansas

**by**

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## Introduction

Since the publication of a special report by the American Accounting Association's (AAA) Committee on the Future Structure, Content, and Scope of Accounting education in 1986, professionals and educators alike have been calling for a change to the accounting curriculum to better prepare the accounting graduate for the professional world. There is a stark division on which skill areas should be improved. That special report predicted "an accounting profession that will provide information for economic and social decisions, using sophisticated measurement and communication technologies applied to a substantially enlarged scope of phenomena" (AAA, 1986). AAA (1986) commented on how the accounting profession was expanding and touched on several topics including accounting information systems and what we would now call soft skills, though more in the problem solving and critical thinking areas. More recently, Low, Botes, Rue, and Allen (2016) interviewed professionals on which skills accounting graduates lacked and found that most professionals assumed that accounting graduates had about the same technical knowledge, and what technical knowledge they didn't have could be addressed in on-the-job training. Instead, when interviewing for new staff accountants, professionals looked more at the soft skills that the potential hires possessed than the technical skills they had listed on their resumé. On the other side of the argument, Pan and Seow (2016) focused on the technological skills that accounting graduates are lacking, particularly the most recent technologies such as IT control and data analytics, and proposed a few new courses to address these technological skills.

There seems to be two major areas that educators or professionals are calling to be improved, soft skills and technological skills. As pointed out by Albrecht and Sack (2000), professionals and educators tend to differ on which areas are more important. In their study, the service that educators thought would be demanded the most was audit services, whereas professionals identified that service as financial analysis. It is necessary to identify the areas that students local to the University of Arkansas must be proficient in and how to improve the education process to prioritize those areas.

To determine how to improve the current state of the accounting curriculum, one must first turn to research that has already been conducted and how it identifies the areas that accounting education must improve on. This paper will divide the areas into two broad categories: technical skills and "soft" skills. Soft skills are defined as those skills that are "required by accounting graduates for employability and career success" (Low et al., 2016). These skills often encompass "communication, team playing, leadership, problem solving, analytical, and interpersonal skills" (Sugahara, Suzuki, and Boland, 2010, p. 2). These skills have the same general characteristics but also have some aspects that are specific to the industry the accountant is working in. Technical skills can be broadly defined as the knowledge and skills to complete the tasks needed in one's position. In terms of the accounting curriculum, this covers basically all of the courses taught from Principles of Accounting 1 to Corporate Tax. There has been a plethora of research concerning what technical and soft skills should be covered in accounting education. This paper aims to synthesize that research with the thoughts from local professionals and educators in the Northwest Arkansas area into a list of proposals that best suit the University of Arkansas. In doing so, other universities may take a similar approach in investigating which adjustments best serve their students and recruiters.

## Literature Review

### Technical and Technological Skills

Cory and Pruske (2012) conducted a study of public accountants and non-public accountants and the skills they deemed important. The top eight equally ranked skills/topics were "spreadsheet software, word processing software, creativity in problem solving, Windows, awareness of ethical issues, internet research, presentation software, and database software" (p. 216). These skills contain a mix of both technical and soft skills, however almost all of the technical skills presented to the accountants that were surveyed pertained to some form of technology. Thus, technical skills are as previously defined as the knowledge and skills to complete the tasks needed in one's position, there is the distinct aspect of technology in technical skills, mostly thanks to the constantly evolving business environment that accountants are working in today.

*Skills in audit, tax, management accounting, and business intelligence roles*

The skills that professional accountants are using have been used as a metric for determining the effectiveness of an accounting curriculum. There are, however, different areas of accounting, usually categorized into four areas: tax, audit, management accounting, and financial accounting. Using data from the O*Net Program, the different tasks and skills that each of these areas use as well as business intelligence analysts have been identified. The O*Net program is a database sponsored by the US Department of Labor that contains occupational information on the knowledge, skills, abilities, work activities, and interests in every occupation. In auditing, the top five most important work activities identified in the O*Net data were: evaluating information to determine compliance with standards, getting information, updating and using relevant knowledge, communicating with supervisors, peers, or subordinates, and making decisions and solving problems. Tax preparers had similar work activities: getting information, interacting with computers, updating and using relevant knowledge, processing information, and performing for/working with the public. Financial accountants had all of the same activities with the exception of processing information and documenting/recording information. The most prominent position for management accountants would be controller. In the O*Net data for that position, the most notable activity not found in the other roles was analyzing data or information.

While these are listed as work activities for each of these roles, it is important to note that a majority of them can be completed with the help of technology and analytics. For example, data analytics is becoming increasingly essential to the audit process for both external auditors and internal auditors. According to Tschakert, Kokina, Kozlowski, and Vasarhelyi (2016), "auditors are using data analytics to enable practices such as continuous monitoring, continuous auditing, and analysis of full data sets in situations where only samples were audited" (p. 2). Data analytics is not confined to an advanced firm proprietary software however. For some auditors, Microsoft Excel is one of the most powerful tools to assist in sampling, verifying calculations, identifying errors, analyzing controls, and fraud detection (Ragland & Ramachandran, 2014). Pan and Seow (2016) identified IT as another important area for accountants today and separated it into four different areas:

- internal control
- IT control and auditing
- data modeling, tagging, and management
- data analytics

They point out with the increasing "IT investment among accounting functions, it is therefore not difficult to understand why there is growing demand for advanced IT knowledge and skills for accounting professionals." Accountants aren't required to become Information Systems experts, but they do need to be familiar with the systems of the companies they are auditing or working for. However, there is a place for accountants in a more technologically heavy area: system implementation. In a case study conducted by Griffin and Dempsey (2009), accountants were said to be "fantastic middlemen explaining to both the vendor and users in layman's terms the solution to the problem" (p. 44). In this area, accountants are functioning more as a business intelligence analyst and a liaison between the technologically minded developers and the business members. This is where the role of the accountant is headed. With the rapid increase of data, accountants must "develop strong analytical and critical thinking skills that include using technological tools to be able to sort, manipulate, and/or perform analytical functions in data extracts in these systems" (Ragland and Ramachandran, 2014, p. 115).

*How professionals gain technical skills*

With these developments, some accountants currently practicing lack the technological knowledge to fulfill the business intelligence roles. How do professionals gain these skills? If the professional has a CPA license, they are required to obtain a certain number of Continuing Professional Education (CPE) hours each year. In Arkansas, the requirement is 40 hours, 50% must pertain to the technical aspects of accounting such as Attest, Accounting Ethics, or Tax and if the professional performs attest services, then 20% of CPE hours must involve accounting/auditing (Western CPE, n.d.). In 2018 the Arkansas Society of CPAs (ASCPA) offered eight hours of CPE credit for an Analytics and Big Data for Accountants presentation. There was also a Cybersecurity Risk Management presentation offered in 2018 (ASCPA, 2018). One source of knowledge that current professionals can learn more about the trending technological and technical skills is the State Society of CPAs.

If the professional works for a public accounting firm, it is likely that the firm is able to provide training for these specific skills, especially the larger public accounting firms. In fact, Pricewaterhouse Coopers (PwC) recently developed an app called the Digital Fitness app. The app assesses the user's competencies and gives a "digital fitness" score. Employees then "choose personal, measurable weekly learning plans that suit their schedules and target the gaps in their Digital Fitness score." (PwC, 2017) The learning plan includes short videos or articles on different tech related topics. Employers then are able to evaluate the current standing of their workforce and can then "create collaborative engagement models and move at the speed of a startup." (PwC, 2017) This app is available for many different employers, so it doesn't just affect public accountants but also accountants in industry.

If the professional needing more technical training to keep up with the rate of technological change doesn't need CPE credits or has access to more in depth training, there is another potential option. According to Kleinman, Siegel, and Eckstein (2002), "work teams are efficient instruments for individualized learning." Teams are made up of professionals from different backgrounds and different competencies, that's what makes the team such an effective unit. It turns out these teams are just as useful to the team members as well as the business that it is doing work for. Work teams accomplish this by design, they "provide a forum for organizational members to recognize and take advantage of a variety of learning opportunities" (Kleinman et al., 2002, p. 430).

*The effect of new technologies on accounting roles*

PwC (2015) describes the impact and disruptive power of data analytics in business in its article, "Data Driven: what students need to succeed in a rapidly changing business world." They identified one of the challenges in the current business environment as "the proliferation of data" (PwC, 2015). The volume of data that each company has is an enormous resource, though the systems in those companies vary in structure. As PwC commented, "some of this data is structured (amassed in one form within a database) but stuck in disconnected systems – much of which simply gets archived without deriving any real value." While a good portion of data management systems are lacking in companies, there is a distinct shift towards making all of that data useable, and by doing so, making decisions with a better understanding of the context of the decision. Accountants in the past have normally only used this data when needed on an audit engagement or a tax return. Those in different accounting roles have the opportunity to improve that process, however, and change their function. As previously mentioned, accountants are excellent at taking technical jargon and interpreting it to something that clients or other users of the information can understand. PwC identified this as a potential role for accountants as well: "Accounting professionals can also use data visualization tools to help others better understand what the data is telling them, such as depicting the ebb and flow of online conversations around a particular topic, or using an interactive chart to allow a user to change inputs and see a new view automatically." In the field of auditing, PwC identified three benefits for embracing the analytical role of accountants: better experience for clients, better experience for auditors, and more valuable insights. The main benefit for clients is the ease of pulling different records for their auditor. With the use of data analytics, clients for audit firms can set up their data to make it easier to gather the relevant information and supporting documentation needed by the external auditor. The benefit for the auditors themselves is relatively the same, by being able to pull data and validate easier with data analytics, auditors "can focus more on the logic and rationale behind data queries and less on getting the data in the first place" (PwC, 2015). As to more valuable insights, PwC stated that "not only does the audit yield important findings from a financial perspective, but also information that can help companies refine processes, improve efficiency, and anticipate future problems."

For management accountants, the amount of new technologies does not stop at software and ERP systems. The IMA (2018) article identified the technologies that are disrupting management accounting as "Big Data, predictive analytics, artificial intelligence (AI), blockchain, cognitive computing, machine learning, and robotics process automation" (Lawson, p. 4). According to Ratnatunga (2015), management accountants must be aware of the technologies that "will have a major impact [on] cost management and decision making." Ratnatunga then discusses the potential effects of different cutting edge technologies from 3D Printing to meat grown in a lab. In Europe, Eurofound (2018) identified five technologies that will drastically change the way the manufacturing industry operates. They identified advanced industrial robotics (AIR), additive manufacturing (AM), industrial internet of things (IIoT), electric vehicles (EV), and industrial biotechnology (IB) as five disruptive technologies to the manufacturing process and key parts of Industry 4.0. In the report they described each technology in detail. Advanced robotics are "digitally enabled robots working within industrial environments that are equipped with advanced functionality" by the use of sensors. Additive manufacturing is the process of building products up instead of cutting them out of raw materials; the best example of this is 3D-printing. Industrial internet of things is the infrastructure that advanced robotics and other smart objects use to function. Electric vehicles are

vehicles that are propelled using electricity instead of fossil fuels. Industrial biotechnology is used "to design processes in industry using yeasts, bacteria, fungi, and enzymes…to produce biomaterials and biofuels." More extensive definitions can be found in Table 1 (Eurofound, 2018). Eurofound estimated the potential market size for each technolog y in Table 2. These technologies represent a large movement towards Industry 4.0 and with them a whole new way of accounting for the costs of these technologies will arise. Accountants will play a key role in the implementation and accounting for these new technologies as seen in the Griffin and Dempsey (2009) case study.

Management accountants of course will not have to be experts in these technologies, but will need to know how they affect costs and how they change the way inventory should be recorded. Auditors will need to know how these technologies will affect the processes of the manufacturing companies and how controls will change because of them. Ratnatunga (2015) comments that while these technologies seem radical and that management accountants might not want to think so far in the future, it is important "to be aware of the dramatic changes to business models that these technologies will bring" (Ratnatunga, p. 6).

**Soft Skills**

As defined previously by Sugahara et al. (2010), soft skills include "communication, team playing, leadership, problem solving, analytical, and interpersonal skills." De Villiers (2012) defined them as "the interpersonal, human, people, or behavioral skills needed to apply technical skills and knowledge in the workplace." He then separated them into five main categories: communication skills, problem solving and thinking skills, leadership and teamwork skills, ethical and moral values, and self-management. Communication skills encompass activities such as presentations, negotiations, conflict resolution, and writing. They also involve active listening, understanding different perceptions and giving and receiving feedback. Problem solving and thinking skills include creativity, framing issues, asking questions, and awareness of ambiguities and complexities. A number of different attributes are involved in leadership and teamwork skills, most notable were drive, project management, leadership social skills including empathy, and team formation and norm setting. Under ethical and moral values, a few traits were listed such as cultural awareness, cross-cultural appreciation, integrity and honesty, and work ethic. Self-management included self-awareness and knowledge, time management, realistic self-assessment, accountability, and continuous learning and upgrading of skills (De Villiers, 2012). These skills and attributes enable an accountant to effectively interact with clients and colleagues.

*Soft skills in audit, tax, management accounting, and business intelligence roles*

Palmer, Ziegenfuss, and Pinsker (2004) conducted a study of some of the competency research and publications concerning the knowledge, skills, and abilities (KSAs) of different accounting roles. The publications ranged from 1989 to 2003 and covered a variety of different accounting fields. Though the topics in each publication covered varying technical subjects as time progressed, some soft skills were a constant. In 1989 the "Big Eight White Paper" listed communication skills and interpersonal skills as needed in accounting. One or both of these terms were included in each of the following publications' summary by Palmer et al. (2004). Soft skills therefore are not new to the accounting field. Though the societal stereotype of accountants is quiet and antisocial, the reality is quite the opposite. Accountants are constantly interacting with people no matter what area of accounting they work in.

In the O*Net data pertaining to auditors, tax preparers, controllers, and business intelligence analysts, there is a section titled Work Context. In this section O*Net sent out surveys with questions such as "how often do you use email in this job?" and "how often do you have face-to-face discussions with individuals or teams in this job?" Many of these questions pertain to the soft skills that professionals are currently using in their respective jobs. When asked how often they use email on the job, 100% of auditors responded with "every day." 81% of auditors said they had face-to-face discussions every day as well. For business intelligence analysts it was very similar, 100% responded that they used email every day, 75% responded that they had face-to-face discussions, and 92% said that it was extremely important or very important to work with others in a group or team. Tax preparers used email a little less than auditors and business intelligence analysts with 45% using it every day and 55% using it at least once a week but not every day. A majority of tax preparers, 65%, responded that they were required to make decisions that affect other people, financial resources, and/or the image and reputation of the organization, indicating that they also use the leadership soft skills as identified by de Villiers (2012). Controllers are more senior in position compared to the respective positions in auditing, tax, and business intelligence roles, so they naturally have more leadership and management roles and thus use more soft skills pertaining to management. Some of the tasks listed in the O*Net data with the highest importance score include supervising employees, coordinating and directing financial planning, and developing internal control policies. The most important skill identified for controllers was critical thinking.

*Technology's influence on soft skills*

By now, email has become an integral part of business communication. With the pervasiveness of email in the business environment, it is imperative that accountants write a professional email. If they fail, it is likely that messages will be misunderstood or the reputation of the sender will be diminished. As mentioned in the O*Net data, the vast majority of accountants in any accounting field use email every day. Thus, it would be safe to assume that there is a fairly normal distribution of accountants that can write professional emails. In a recent article published in the CPA Journal, Belik and Violette (2018) analyzed the perceptions of students on professionalism, specifically between domestic and international students. One portion of that study was on the use of communication devices and social media in the workplace. They found that students considered it "sometimes acceptable" for professionals to use cell phones for personal calls and text messages during the workday. This rating hinged on the context of the situation, because when asked if it was acceptable to do so during a work meeting, a majority of the students considered taking personal calls and text messages not acceptable under any circumstance. (Belik & Violette, 2018) This study is interesting because the results to the questions concerning social media and cell phone usage were fairly consistent between the two groups surveyed.

New associates are not the only ones who could benefit from social media use. Warlick (2018) argued five reasons why firms should have a social media presence. She stated that first social media allows firms to build relationships, especially with potential clients or colleagues, and argued that doing so will "dramatically increase the chances of eventual business opportunities with these people and the firms they represent" (Warlick, 2018). The second reason Warlick gives is that social media allows firms to establish thought leadership. She argues that by posting on social media about complex issues and new developments, followers "begin to recognize you for the expert you are." By becoming more active on social media, Warlick claims

that firms will reinforce niche specialties, attract new talent, and maintain high visibility. Her reasoning for high visibility seems to be valid in potentially drawing in new clients, if clients find they need a specialist to address some accounting need, they might first ask about the one they see most often on social media. The problem with this logic is that most of the large companies have established relationships with the accounting firms that they work with, so this might only work with smaller companies or if large companies decide to look for a change. Considering her claim that increased social media use attracts new talent, a 2013 article published in the CPA Journal found that the students surveyed spent on average "less than 30 minutes per week using online social networking for recruiting purposes during their last job search" (Herbold & Douma, 2013). While this information seems to go against Warlick's reasoning, it is important to note that the Herbold and Douma article is outdated in terms of technology and it only focuses on students in the recruiting process. It is possible that a strong social media presence might attract talent already working, there simply is not much research on that subject. Seemingly in response of the lack of quantifiable data concerning social media, Warlick makes a point that the reasons that she presents "strengthens and supports your brand" (Warlick, 2018). Social media itself presents an interesting scenario in which students going through the recruitment process potentially know a good deal more about how to behave professionally in this new environment and thus the soft skills unique to those platforms.

## Goal Skill Set of Accounting Students

Accounting students are expected to be prepared to transition to professional work fairly smoothly. However, some of these skills are difficult to teach in the university setting. Keeping this in mind, some research suggests that the focus must be on "the ability to develop, change, and renew skills and knowledge throughout life" (Kavanagh & Drennan, 2008). While this is true for some skills, especially those that are based in experience, there is a specific set of skills that accounting graduates will need to have when beginning work. There are different groups that dictate this skill set: employers, the CPA Exam, the Association to Advance Collegiate Schools of Business (AACSB), and the educators themselves. All of these organizations have different expectations as to what accounting students need to learn in tertiary education.

### *Determinants of the goal skill set*

#### Employers

Employers have become increasingly concerned with more of the soft skills that students possess instead of the technical skills, because the employers assume that the candidates they choose to interview understand the fundamentals of accounting and they expect to train new associates in the technical areas. One of the participants in Low et al. (2016) stated, "when somebody starts we don't expect them to have all the technical skills because it is part of our responsibility that we teach them or give them the skills they need to do the technical work." Low et al. (2016) indicated that employers expect to address the technical skills of graduates through on-the-job training. After gathering several job postings for entry level accounting positions in the local area, the requirements listed have a distinct soft skills focus. The requirements of strong accounting knowledge and technological literacy are still present in all of the job postings, but they only take up a couple of lines. The rest of the requirements and qualifications for associates focus more on critical thinking, problem solving, ability to research into topics, and above all interacting with clients and colleagues. A Deloitte posting for a staff auditor broke down the requirements into two parts, auditing skills and professional mindset,

what they call “skill and will.” In contrast, PwC seemed to be focused on the technological skills of accounting students as well. PwC (2015) laid out three ways they believe universities can address the changing technological environment: adding technical skills in the undergraduate program, adding technical skills in the graduate program, and focusing on leadership. The first area suggests implementing technical skills in undergraduate programs by “infus[ing] analytical exercises into existing curriculum to help students develop data analytics proficiency on top of their core accounting skills.” They suggested to shift the statistics courses from theory to more programming and analysis heavy. Specifically they propose three courses: a basic computing course which focuses on programming, spreadsheets, and databases and two statistics courses, the first of which focuses on programming in R, data cleaning, and data visualization. The second statistics course focuses more on “documenting analysis in R” and dealing with data problems and predictive statistics. On top of these courses they suggested that more case studies be implemented in classes to increase hands-on use of analytics tools, specifically using real-world concepts so that students will have a better understanding of how to conduct this analysis when working.

Association to Advance Collegiate Schools of Business (AACSB)

The AACSB is a large influencer of what accounting curricula cover and by extension what skills accounting graduates should possess. In the preamble to the 2018 standards, the AACSB stated that “business schools and accounting academic units must respond to the business world’s changing needs by providing relevant knowledge, research, and skills to the communities they serve.” They define their purpose as the encouragement of business schools and accounting departments to improve the business and accounting practice through “scholarly education, engagement, innovation, and impactful intellectual contributions.” The AACSB claims to achieve this purpose by “defining a set of criteria and standards, coordinating peer review and consultation, and recognizing high-quality business schools and accounting academic units that align with the standards and participate in the process.” The main way that the AACSB determines what skills the accounting graduate should have is through the standards they place on participating accounting departments. There are several standards on the structure and organization of business schools and accounting departments in order to be eligible to be accredited by the AACSB, however the focus here will mostly be on the curriculum standards. Standard A4 states “Curriculum is appropriate to professional expectations and requirements for each accounting degree program. The accounting academic unit uses well-documented, systematic processes for determining and revising degree program learning goals; designing, delivering, and improving degree program curricula to achieve learning goals; and demonstrating that degree program learning goals have been met” (AACSB, 2018). Within this standard, the AACSB defines some content areas that accounting departments should cover in different degree programs. Some of the topics required include:

- The ability to identify issues and develop questions, apply appropriate analyses, interpret results, and communicate conclusions.
- The roles accountants play in society to provide and ensure the integrity of financial, managerial, and other information.
- The ethical and regulatory environment for accountants.
- The critical thinking and analytical skills that support professional skepticism, risk assessment, and assurance of accounting information.
- Internal controls and security.

- Recording, analysis, and interpretation of historical and prospective financial and non-financial information.
- Project and engagement management.
- Tax policy, strategy, and compliance for individuals and enterprises.
- International accounting issues and practices, including roles and responsibilities played by accountants in a global context.

A lot of these topics include a mix of soft skills and technical skills, for example project and engagement management. Students will need to both have the technical knowledge to address the issues within the project and have the soft skills to interact and collaborate with other students. The first topic of applying appropriate analyses can potentially include the technological aspects of analysis and also address the data analytics topics as enumerated by PwC (2015). Standard A5 addresses the technological topics: "Consistent with mission, expected outcomes, and supporting strategies, accounting degree programs include learning experiences that develop skills and knowledge related to the integration of information technology in accounting and business. This includes the ability of both faculty and students to adapt to emerging technologies as well as the mastery of current technology" (AACSB, 2018). Within this standard the AACSB identifies three primary components:

1. Information systems and business processes including data creation, manipulation/management, security, and storage.
2. Data analytics including, for example, statistical techniques, clustering, data management, modeling, analysis, text analysis, predictive analytics, learning systems, or visualization.
3. Developing information technology agility among students and faculty, recognizing the need for continual learning of new skills needed by accounting professionals.

Some of these skills are not evident in every accounting position, but it is likely that the roles of accountants is heading in this direction. Each accounting department, however, has another determinant on top of AACSB standards, making it difficult to reach all of these standards from the AACSB.

CPA Exam

The most influential factor in determining what to teach in an accounting degree program is the CPA Exam. If the program adequately prepares students for the CPA Exam, usually quantified by pass rates, then it is working well. In the past, schools offered CPA prep courses, but currently there are no courses offered specifically towards the CPA exam because colleges did not want to be seen as "CPA mills." The CPA Exam itself has evolved over the years to attempt to stay in line with what professional accountants are doing today. Tysiac (2017) explained that "the updated exam places greater emphasis on higher-order skills of analysis and evaluation, and lowers the emphasis on remembering and understanding" (p. 41). This can be seen by the increase in the number of task-based simulations and the decrease of multiple choice questions in every section as seen in Table 3. This change indicates that the profession as a whole is becoming more analytical than rote tasks and since accounting graduates usually take the exam soon after graduation, their skill set should also include an analytical side.

*Educators' opinions on the goal skill set*

There have been several studies on the accounting education process and how it should change. Recent studies focused more on the technological requirements of accountants now that should be incorporated into the accounting curriculum, however there is some research focusing on implementing soft skills into accounting education. For most accounting departments, the technical skills defined as the knowledge of accounting concepts is the focus. They tend to focus more on students receiving the technical knowledge required for the CPA exam as opposed to the technological skills they might need on-the-job or the soft skills they might need for interacting with other business people.

Suggestions for technological skills

Pan and Seow (2016) suggested four different courses ranging from elementary level courses to advanced courses. The first course they suggest is called business process analysis and accounting and they suggest it to be at the elementary level. This course is stated to "equip accounting students with basic database and documentation skills, and helps them gain an understanding of accounting processes, including ordering, purchasing, production and human resources, and data stores" (Pan and Seow, p. 170). Pan and Seow (2016) make a point that this first course should focus more on internal control and transactions processing than software and hardware concepts. The second course suggested is labeled IT forensic. The purpose of this course as explained by Pan and Seow (2016) is to "put an emphasis on the legal framework and the investigation of fraud, principles of handling computer evidence, analysis of computer evidence, and presentation of evidence in a court as an expert witness" (Pan and Seow, p. 171). They argue, that since data analytics is growing, the "use of analytical technologies to identify fraud may increase." Also, with the amount of data that companies are generating, traditional means of investigating fraud will likely be more difficult and time consuming. Teaching fraud then must become more "technology-centric" to help prepare students for working on fraud cases. The third class that Pan and Seow (2016) suggested to implement in accounting curricula is a course they titled enterprise accounting systems. The course covers enterprise resource planning systems and Pan and Seow (2016) cited a study by Greenstein and McKee (2004) enumerating thirty-six important information technologies. Greenstein and McKee (2004) identified several different technologies ranging from word processing and spreadsheets to computer-aided systems engineering tools and intrusion detection and monitoring. Pan and Seow (2016) pointed out from that study some "sophisticated areas" such as expert systems, encryption software, computer security, and enterprise resource planning systems. They state that the purpose of this course is to "enhance students' knowledge in advanced technologies, including XBRL, data mining and data warehousing" (Pan and Seow, p. 171). The final course that Pan and Seow (2016) suggested is a course labeled "business analytics for accounting professionals." The main objective of the course is to help students learn "to identify the information needs of an organization as well as information that would drive competitive advantage" (Pan and Seow, p. 171). They also explained that students would explore the different technologies involved in business analytics and how to best use them. Pan and Seow (2016) commented on a reason why this course would be a good addition to the AIS coursework. They claimed that if the accounting function "can generate insights that help make better corporate decision making, while continuing to ensure effective control of the enterprise, its reputation as a catalyst for growth will be guaranteed" (Pan and Seow, p. 171). In this, Pan and Seow (2016) point out that accountants are becoming increasingly more important to decision making and no longer the stereotypical

person working away in the corner on a 10-key. Instead they have the potential to become business analysts and, as illustrated by Griffin and Dempsey (2009), liaisons between the IT department and the decision makers. This comes from an understanding of the technology side of business, but a good portion of it comes from the soft skills that accountants develop.

Suggestions for soft skills

In order to address the soft skills that accounting graduates need, accounting departments and professors have to be creative. Kermis and Kermis (2010) argued that since the AICPA added soft skills, "a case can be made that accounting educators have a responsibility to help prepare students to make the transition from unfocused high school seniors to contributing members of a professional service team" (Kermis & Kermis, 2010, p.1). Kermis and Kermis (2010) argued that the role of the educators in developing students in this area needs to shift from "the sole source of information" for students and instead become "guides for their students" (p. 5). To do so the strategies used in the classroom "must provide opportunities for self-development and integrate content learned with real world experiences" through tools such as "interactive case studies, simulations and games, and teamwork" (Kermis & Kermis, 2010).

One example of these ideas in action is an advanced managerial accounting course that Denison (2018) developed for Iowa State University. She pointed out that most instructors take a theoretical approach to presenting information, which she argues is "entirely appropriate" because "at this point in history, the pace of change in technology, business, and the accountant's role is rapid" (Denison, p. 38). She states then that "the most important thing instructors can do for students is to ground them in the philosophy, principles, and reasoning involved in accounting rather than trying to train them for jobs that will have evolved by the time they graduate" (p. 38). However, this approach doesn't present to students the whole picture of the job of an accountant and as such "many instructors and developers make efforts to incorporate realistic elements into their classes" such as "case studies, inviting practitioners to speak in the classroom, taking students to on-site visits, and involving students in simulations" (Denison, p. 38). In order to take the realism of her class to the extreme, Denison (2018) developed a course with the purpose that the students would "work in an environment that was closer to what they would experience in a job than what they'd so far experienced in the classroom" (Denison, p. 38) The course objectives for the class encompassed a few other areas outside of managerial accounting from a theoretical standpoint:

- Use cost concepts appropriately in management decision situations
- Gain proficiency in data analysis and data visualization
- Effectively prepare information to support management decision making
- Gain experience and competency working in teams
- Gains skills in communicating accounting information in writing
- Gain skills in communicating information orally
- Gains skills in creating visual representations of accounting information

Her main focus was on developing three main areas of soft skills: teamwork, communication (written and oral), and flexibility. Overall, she reported that the course was a success, mostly measured by the responses from former students that had taken class saying that "they felt it helped prepare them for their jobs" (Denison, p. 43).

## Analysis of Opinions on the Accounting Curriculum

### Opinions from local professionals and educators

In order to discern the needs of professionals and educators specific to the University of Arkansas, two professors, two professionals, and one professional in their first year of academia from the local area were interviewed individually. Participants were asked four common questions, two questions specific to their classification as a professional or an educator, and two questions specific to the individual's role in the education process. Participants 1 and 2 are educators, Participants 3 and 4 are local professionals, and Participant 5 is a local professional who has recently transitioned from professional work to education. Further descriptions of each participant can be found in Table 4.

*Opinions on the skill set of accounting graduates*

When asked what the best skill set for an accounting graduate would be, Participant 3 (P3) mentioned that there were the "broad skills that everyone talks about" such as "be[ing] open minded, ask[ing] questions, be[ing] adaptable, and be[ing] willing to learn" but as far as technical skills went, P3 made a point that Excel was definitely necessary as well as "know[ing] your way around a computer and maybe understand[ing] business processes and controls." Participants 1, 2, and 5 focused more on the accounting fundamentals that students would receive through their education. P2 stated that students would "immediately be able to leverage" the knowledge of those fundamentals and believed that those skills were "the most powerful of their skills." P1 differed in this stance in that a skill set they believed students need to improve on was the application of that technical knowledge, in their words "learning how to try to find an answer to a question without just asking someone." Even though some of the participants touched on the technical skills they deemed best for accounting graduates, all of the participants mentioned some form of soft skills. Every participant listed "good people skills" or "communication skills" as part of the accounting graduate skill set. This reveals that both educators and professionals are aware of the need for soft skills coming out of education process and into the professional world. P2 differed from the rest only by making the point that while "good people skills are of course important, it alone won't sustain itself."

*Opinions on the effectiveness of the education system*

In addition to being questioned on the skill sets of accounting graduates, participants were asked to opine on the effectiveness of the current education system. Participants 1 and 2 were specifically asked how effective they believed the curriculum at the University of Arkansas was at preparing graduates. P1 focused more on the soft skills and professionalism. In their opinion, they "don't think some students are prepared for going out and working with other people." P1 did identify a way they were trying to improve these skills in students was by allowing students to work in groups for quizzes. The groups are organized by P1 so that a different mix of knowledge levels are represented in each group. This "makes you work with other people and not necessarily people you know." P2 focused more on the undergraduate program as a whole. Their main concern was "the extent an undergraduate degree by itself can really address the complexities in the business world today." Overall, the responses to the effectiveness of the education system were positive. P5 stated they "didn't see any particular issues with UA students" and P2 agreed, saying that while "we do want well-rounded professional people to come work, at the end of the day you better have the technical chops and I think that's one of our strong suits." Participant 4 made an interesting point in that they would

like to see universities approach accounting "as a trade." The idea being that just as students training to be mechanics work on engines and automobiles, students training to be accountants and auditors "should do audits and tax returns." P4 mentioned that currently they are "teaching how to audit" so instead the skills of accounting graduates should encompass soft skills and accounting fundamentals. They acknowledged that those two statements conflicted, however I believe they function better as a short-term view and a long-term view. Long term, perhaps it would be better to incorporate more trade school like attributes to the accounting program, short term however the students do need soft skills since most firms are teaching their own processes in audit or other functions. P5 agreed with the short-term idea in saying "we're going to teach you a great deal about what we do and how we do it." So the current state of the accounting environment in the local area is that firms are teaching most of the technical skills by building off of the fundamentals that students learn during their education. This is not necessarily bad, however the education side of the process still needs to "evolve" as P2 said to keep up with important trends in the profession.

*Opinions on the purpose of an accounting undergraduate degree*

Participants 1, 2, and 5 were asked on what they believe the purpose of an undergraduate accounting degree was. All of them mentioned providing a foundation in accounting and business skills, P1 and P5 both emphasized the opportunities that can come from obtaining a CPA License. P1 even went so far to say that "an accounting student isn't successful unless they can pass the CPA exam." I believe that while this statement paints with broad strokes, the underlying idea is not entirely untrue especially for students who wish to pursue a career in public accounting. P5 reinforced this idea by saying that "you can do tons of things with a CPA credential, it doesn't box you in, it actually expands your horizons and makes you marketable." Since P5 recently came from public accounting, these two statements can be used to show that educators and professionals alike place a great amount of importance on the CPA license. P1 did mention that in the local area and in the areas that most University of Arkansas students are from such as Texas and Kansas City, there are a lot of industry jobs. Northwest Arkansas is especially unique due to large company headquarters such as Walmart, Tyson, and JB Hunt being located in the area. This allows some students to focus more on industry careers than perhaps students in other areas don't have access to. When asked how other certifications such as the CMA or CISA, P1 acknowledged that the CMA is a little more useful to students who want to go into industry accounting since it focuses more on cost control. They also emphasized the difficulty there is in teaching since there is such a push to prepare students for the CPA exam, it's hard to teach the topics needed and also let students know that there are plenty of opportunities that aren't public accounting. P5 agreed that it was perfectly fine for students to pursue a different career path and not pursue a CPA, but also didn't "see the value in trying to focus the educational efforts in a direction leading to [other certifications]." P2 when asked on the purpose of the undergraduate accounting degree mentioned that the perception of accounting was shifting in that "in business we tend to use the word accounting less and less as a label" and seemed to believe that an accounting degree is a valuable opportunity "for people to become strong business people." From these two statements we can infer that P2 sees the role of accounting shifting from an isolated area in a business to pervading the entire business and thus the degree becomes even more valuable. I believe this to be true as well but for the degree to stay valuable, we need to "always be evolving" as P2 mentioned from an education standpoint.

*Opinions on curriculum change*

Participants 1 and 2 were asked how effective they believed the curriculum was, if they believed it should be changed and, if so, what barriers exist to change it effectively. Both expressed concerns for different areas of the degree program, but neither mentioned the technical skills being taught. Combined with their responses to other questions, both do not seem worried about the technical accounting skills that students are learning at the University. P1 said that the area they "always get comments about [is] soft skills." When asked for their definition on soft skills, P1 indicated that soft skills are essentially "non-academic" skills, such as "communication skills, relating to other people." P2 was more concerned on how effective an undergraduate degree in accounting is in "address[ing] the complexities in the business world today." They mentioned that while there is value in the undergraduate degree, they believe "preparation demands more than just the 120 hours." This however is not entirely caused by the curriculum of an accounting undergraduate degree, but rather from a shift in societal expectations of college students in general. An undergraduate degree, while valuable, is simply not enough to prepare for the business world. P2 explained that further preparation outside of the undergraduate degree is different for each student by saying, "for some students that means a Master's degree or possibly a different set of electives to complete a double major."

Participant 3 was asked about their recent transition into the professional world at a Big 4 public accounting firm. They were asked specifically how prepared they have felt in their transition and if there were any courses they took outside of the accounting curriculum that they believed should be integrated into the accounting curriculum. Since they work in risk assurance, they said, the focus is on controls and specifically IT controls. As far as technological skills go, they said they've felt prepared thanks to the internships that they worked in and to the Accounting Technology course at the University of Arkansas because of the coverage of databases and SQL queries. P3 mentioned that "a lot of risk assurance professionals need a good understanding of how systems and databases work." Granted, risk assurance is a small but growing field, so not every accounting student may need the amount of knowledge that a risk professional needs, though they are not topics that can be ignored. For example, one set of courses that P3 found especially useful were found in the graduate program that covered ERP systems. They stated that even for "core audit" professionals this knowledge is important because the accounting data that is going to be audited will be stored in ERP systems. They also mentioned that the audit course itself was a strange class because "a lot of that class is just reading and memorizing." This is a sentiment that came up in other interviews in that it is simply difficult to teach audit without actually doing an audit. This reinforces the idea that P4 mentioned in approaching accounting like a trade. P3 agreed with this idea in suggesting a "hands on assignment would be really beneficial" because "once you start doing it, it all makes sense like why you sample and how to get comfort over certain things like completeness and accuracy and different managerial assertions."

Both Participant 1 and Participant 2 indicated that the curriculum needs improvements, P2 saying that "curriculum should always be evolving," though the barriers they pointed out are truly difficult to overcome in effective curriculum change. The two largest barriers that P1 pointed out were time and class size. Time being the amount of time in a degree program to teach everything that is on the CPA exam. P1 referred to their time teaching for Becker, specifically the FAR section, and emphasized how much material an accounting student needed to know from principles to advanced accounting. Since students need to know so much, it

becomes difficult to implement some kind of extra communications or writing classes to improve non-accounting skills, not to mention the increasing technological skills present in accounting positions. The solution to that problem is then to implement the needed skills within the existing courses, which runs into the second barrier: class size. In order to truly improve the soft skills and technology skills, the lessons have to be more personalized since some students have differing levels of knowledge on these topics. When class sizes are small this isn't that much of a problem as P1 mentioned with their group quizzes, "if you have 30 people in a class, group quizzes are easy." They said that in another university they taught at, the class size was 75-80 and they still did group quizzes "but the coordinating is difficult." When trying to implement technology skills into the classroom, class size becomes a factor again, because as is common with any technology, there are several ways to come up with a correct answer and more ways to come up with an error message. With these possibilities, the instructor or professor has to be able to address most of the problems that the student runs into, and with large classes it becomes practically impossible to both teach the content and field the error messages that students might run into. P2 brought up a different barrier that applies to every accounting department, the CPA exam. Part of what deems an accounting department successful is how well it prepares its students for the CPA exam, and for some programs, that is the primary goal. This isn't necessarily a bad thing, the CPA exam is a difficult exam and as other participants have mentioned, it sets students up with many opportunities to pursue. However, the CPA exam doesn't test some vital business skills that accounting students need to succeed, namely technology skills and soft skills. P2 points out though that the CPA exam is "one of those things that's easy to complain about, but it's hard to come up with a solution for it." They bring up that perhaps it's not the CPA exam that's the problem, but rather the factors that influence the exam. P2 gives the example that "a lot of auditors will tell you today that they think there are some things that they can do better if it was just left up to them, but they still have to comply with the audit standards set by the ASB or the PCAOB." Whether or not the standards are as effective as they should be falls out of scope for this thesis, but it does raise an interesting point, that while the CPA exam is certainly a driving factor in accounting curricula, it itself is influenced by other forces as well.

**Synthesis of opinions**

There is room for improvement in the accounting curriculum, the difficult part is finding a practical way to improve it. This will take a combination of different ideas from research and publications from accounting firms and the opinions from the educators and professionals that are part of the "educational value chain" specific to University of Arkansas accounting students. The research used will mainly stem from the publications that provided opinions on how the goal skill set of the accounting graduate should look. The synthesis of these two main sources of information will provide a basis to the proposals for the accounting department at the University of Arkansas. Consistent with the structure in the literature review, the synthesis will be focused on the main two areas of skills: technical/technological and soft skills.

*Technical and technological skill solutions*

Several bodies determine what technical skills accounting students should graduate with, namely employers, the AACSB, the CPA exam, and educators themselves.

### Employers

PwC (2015) provided a few suggestions on how to improve the technological skills of accounting students in the accounting curriculum. They suggest to include three courses in the undergraduate curriculum, a basic computing course and two statistics courses. In the current curriculum, all business students are required to take an information systems course which covers most of the topics that PwC (2015) describes concerning the basic computing course. In my opinion that information system course is not especially effective in teaching the basic technological skills necessary for accounting students due to the timing of taking the class and the context of the class. The class is usually taken within the first few semesters of a student's career. At that point in time, students are not aware of enough of the business environment to fully understand how these information systems fit in to the business process. The context of the class also could be improved since for an accountant, an understanding of information systems is increasingly critical as opposed to other business majors. Perhaps, this course could be fulfilled by the Accounting Technology course with another more analytics focused course in place of Accounting Technology. PwC (2015) then suggests two statistics courses. One focused on programming in R, data cleaning, and data visualization and the other focusing on "documenting analysis in R" and dealing with data problems and predictive statistics (p. 15). On top of these three courses they describe, they propose implementing more hands-on use of analytics tools and real-world concepts. This is a lot to ask of an accounting program where employers are not the only stakeholders in the education process. PwC (2015) proposes shifting away from a theory heavy course to more applied. Some of the statistics and analytics skills proposed need a good understanding of the theory behind them. While PwC (2015) would suggest to completely change the Data Analysis and Interpretation course at the University of Arkansas, it would be difficult to teach both the underlying theory to understand the skills and the skills themselves in a single course. The barriers provided by Participant 1 would be the largest barriers to this structure in that the time allowed in an undergraduate program and the size of each class simply prevents it. If PwC (2015) is suggesting to add an accounting-specific statistics course, time is a factor as well as personnel. The accounting degree is packed with required courses, leaving little room for electives, and I believe a statistics course with an accounting focus, would provide little added benefit. I agree that there should be hands-on assignments and real world concepts implemented in classes, but they need to be carefully planned in the context of what needs to be covered in the course conceptually and the size of each section. At the University of Arkansas, the current business statistics courses (Data Analysis and Interpretation) have large class sizes. Coordinating a hands-on assignment would be difficult. As students get into the upper-level courses however, there should be more assignments like these. As Participant 3 mentioned, the audit course is good theory but students don't quite know why certain things are true until they start trying to apply that knowledge in the real world, either during their internship or when they go to work.

### The AACSB

The AACSB's standards provide a good benchmark of where accounting departments should be or should be going. In terms of technology, Standard A5 provides the three areas that accounting departments should be focusing on for information technology concepts:

1. Information systems and business processes including data creation, manipulation/management, security, and storage.

2. Data analytics including, for example, statistical techniques, clustering, data management, modeling, analysis, text analysis, predictive analytics, learning systems, or visualization.
3. Developing information technology agility among students and faculty, recognizing the need for continual learning of new skills needed by accounting professionals.

The accounting curriculum at the University of Arkansas does cover some of these topics such as information systems and business processes and some data analytics. The information systems course was covered above. Business processes are covered for accounting students in the Accounting Technology course. In that course students learn how to diagram these business processes and also how to create and query databases, which touches on the second half of requirement 1above. Participant 3 specifically referenced this course as a helpful class, so there is value in covering these topics especially to students who plan to be auditors. Other accounting roles also need this knowledge, especially those in industry accounting roles, as they can assist in implementing new information systems. Griffin and Dempsey (2008) illustrated this in their study of an accountant's role in the implementation of an information system in Ireland. Data analytics skills are taught at the University, however the statistical techniques covered in the Data Analysis and Interpretation course use mostly Excel and if not that, then by hand. Excel is not a bad tool to use in that context, but there is statistical analysis software specifically made for these problems and they are not difficult programs to learn to use. Data visualization is again taught in the Accounting Technology course, but only briefly since there are a lot of different technological concepts to cover. Most of the other details in requirement two are lightly introduced if at all in the undergraduate program, most of the advanced topics are covered in the Master's program, such as the ERP courses that P3 mentioned. Requirement three from the AACSB is encouraged, though to the extent that it is pursued in the accounting curriculum is difficult to measure. Mostly, the responsibility to pursue the goal of continual learning falls on the student, as Participant 5 said that a "willingness and interest in what's cutting edge will serve you well." For the most part it is up to the student to pursue that extra knowledge, the only thing that the department would need to do would be to make sure resources are available to the students or that the students know about them. The accounting department at the University of Arkansas does cover these requirements and are accredited by the AACSB, the question is, though, if what the department is doing now is enough, or if it's effective. Participant 2 said, the "curriculum should always be evolving" and this is the time to start implementing changes that will have a lasting effect on the students that go through the program and into their careers. Participant 3 referred to two courses in their interview: Accounting Technology and Audit. The former they praised and still use the concepts that they learned in their job. The latter did not receive as much praise, and was actually the course they believed was "weird."

Educators and the CPA Exam

Educators usually set the structure of their courses to cover what the CPA Exam tests on. Participant 1 and 2 both cited this as a focus that accounting curricula needed, and the other participants confirmed this from the professional's side. The CPA Exam however, is changing. As previously mentioned, there are more questions and simulations that test analysis skills and less questions that only test the "remembering and understanding" areas (Tysiac, 2017). That means that the accounting department should be looking to increase the analytical skills of the students they educate, however they must also make sure to cover some other areas that the CPA exam doesn't cover, namely information technology. Participant 2 pointed out that this is an area

that the accounting department here struggles with. There have been several publications that suggest different approaches to improving the technological skills of accounting students, specifically for this thesis Pan and Seow (2016) will be the focus.

Pan and Seow (2016) provided a framework for four courses they believe should be implemented to improve the technological skills of accounting students. I agree that these courses would improve the technological skills of students drastically, however implementing these courses in an established accounting program like the one at the University of Arkansas is practically impossible, at least in the way that Pan and Seow (2016) describe. Accounting departments can't just add four new courses, that kind of change takes an immense amount of time, thought, and money. They can, however, look at the topics covered and determine the best way to implement them into the existing curriculum. For example in the first course that Pan and Seow (2016) suggest, they emphasize business processes and analysis concepts such as database and documentation skills. These are concepts that can be found in the AACSB standards and are topics I think should be covered in the curriculum. Some of the topics suggested by Pan and Seow (2016) are currently covered in the Master's program such as ERP systems and data mining. These are fairly advanced topics, so I'm not sure how in depth an undergraduate program could go in these concepts. The final course they covered is an especially important course as it combines the technological and analysis skills. Pan and Seow (2016) labeled the course "business analytics for accounting professionals" and they stated that it would allow students to explore different technologies and how best to use them. From my understanding of the evolving role of the accountant, this is going to be one of the most important areas for accountants. As seen in Griffin and Dempsey (2008), accountants are becoming more influential in decision making and implementing new systems. They have the distinct ability to take technical language and make it understandable to others. Participant 1 mentioned this in the tax setting, how in their role as a tax law specialist, they could look through and research the code and explain it to business owners so they understood what they needed to do. Pan and Seow (2016) as educators are keenly aware of what barriers exist for effective curriculum change and point out some barriers to their own suggestions:

- "…a critical issue is whether these AIS courses should be taught by accounting professionals or IS professionals?" (p. 171)
- "Should this content be taught in a standalone course or embedded in some existing courses?" (p. 171)
- "To strongly promote AIS courses to accounting students, we need support from the accounting and auditing committees. For instance, professionally accredited programs, such as certified practicing accountant (CPA) program, currently…leav[e] little room in the program for modules that advance IT knowledge." (pp. 171-172)

They identify that the main barriers to their proposals are personnel, course organization, and a lack of incentives from the professional side to justify a shift in focus. These barriers line up well with what participants identified as barriers to curriculum change at the University of Arkansas. In order to be effective in training accounting students in these concepts the professors that are teaching these courses need to be accounting professors with specialized knowledge in some information systems. The problem is identifying professors that fit that specification. As established previously, this content can't be in new standalone courses, the curriculum is simply too full, which leads to another barrier in that some professors teaching the current classes are not technologically savvy enough and would need to be trained. It seems that the CPA exam and

other accounting committees have noticed the need for a change and it simply takes a long time to make such drastic changes. Pan and Seow's (2016) suggestions together are difficult to implement thanks to the barriers identified by Participants 1 and 2, however the concept business analytics and transforming technical knowledge into understandable language is a skill that I believe is what will determine how well accountants fare in the future and should be implemented in classes as much as possible.

*Soft skill solutions*

The employers have an interesting opinion on what graduates should know coming out of an accounting degree program. The current system works where the university provides the fundamental accounting knowledge, the "debits and credits" as most recruiters refer to it, and the employers then teach the new hires the rest of the technical skills through on-the-job training. This is seen in the comments from participants in Low et al. (2016). What is also seen there is that employers are emphasizing more soft skill training from universities, as is confirmed by Participant 1. The question is, does this current system work as effectively as it could? Employers as seen in some job postings from local employers do mention technical skills, but they seem to be more interested in a student's personality and soft skills, knowing that they can teach the technical skills. Participants 3, 4, and 5 when asked how they identify top candidates focused more on how personable they are and how they present themselves. All three mentioned that it started with the résumé and how clean it was. Mostly this shows them how much work a student is willing to put in to get a job, but there is a distinct skill also at work in the résumé that is at play: writing. Written communication comes in multiple forms, usually emails and executive summaries, but the résumé is another form of it. There is a specific type of writing that goes into preparing it and if it is the item that gets students in the door with employers, then they should know how to prepare one. I believe that the business college as a whole does a good job in preparing students in this area, and there isn't anything particular to accounting jobs that require special résumé treatment. However, some high achieving students out of high school never have to enroll in a composition or literature class, since they received credit through AP classes or fulfilled the requirement with certain ACT scores. This doesn't mean they don't know how to write, in fact they've been able to "clep out" of these classes under the assumption that they know exactly that. However, there are some valuable skills to be learned from these courses, such as reading something and being able to interpret its meaning. I don't think that requiring accounting students to take a literature or composition class is the most practical way to address writing skills, but I think it should be encouraged.

In addressing the other soft skills such as speaking and presenting, there are a few ways I believe they can be further taught. First, Participant 1 mentioned in their interview the local chapter of Beta Alpha Psi (BAP), an honors accounting, finance, and information systems organization that focuses on professional development and networking. Meetings for organizations like BAP provide an excellent platform for students to interact with employers and for employers to teach a little on a certain professional development topic. Topics range from how to dress in different situations to what kind of subconscious shortcuts people make when making decisions. Knowing that the curriculum's primary focus is to give students the "technical chops" as Participant 2 said, organizations and events like these provide an excellent way to improve student skills without running into the barriers of time and class size. Currently the local chapter of BAP is not open to all accounting students, which after talking with professionals and educators is actually uncommon. At other campuses, any student can come to the meetings and

network with the employers. This is reinforced by Kermis and Kermis (2010) in saying that accounting departments "must provide opportunities for self-development," though BAP and other organizations' events are only good in developing a part of soft skills. Presentation skills are better addressed in the classroom, though presentations are something that Participant 1 specifically pointed out as being limited by time and class size. In this area, courses might need the most change. Some courses shouldn't be changed as much as they are a better fit as theory courses and are necessary in receiving the foundational knowledge to apply to any given situation, such as intermediate accounting. In some other courses however, there might be room to implement some more presentation opportunities. Denison (2018) provided an example of a course she designed to cover these very topics. A course exactly like the one described would be difficult to implement at the University of Arkansas, though some of the mechanics could be integrated into courses. One mechanic is the increased amount of group work. In the business environment, rarely does an accountant work alone, instead there are teams that address the tasks presented to them. Participant 1 mentioned their use of group quizzes in their courses as being more representative of how students will work. They will be grouped with people of varying skill levels and attempt to achieve a common goal. Kleinman et al. (2002) gives another reason as to why group work should be integrated more into the classes. Teams, according to them, "are efficient instruments for individualized learning." Another mechanic from that course was that in most assignments, students were analyzing and applying as opposed to simply memorizing and regurgitating. The former strategies allow students to learn to understand why something is done this way as opposed to blindly accepting it. Critical thinking was identified as an important soft skill and providing more assignments that make students analyze and apply their knowledge will improve their critical thinking skills. This however only really fits well with some upper level courses as there are more opportunities to apply that knowledge as opposed to Principles 1. Denison (2018) provides an excellent example of a course that focuses on the soft skills that accountants will use and according to her students, it does reflect how the job actually is.

**Proposals to the accounting department at the University of Arkansas**

The proposals and suggestions from several sources in this thesis are too much to put together and change at once, instead change at the University of Arkansas will need to be small at first and build towards longer term goals. The current accounting curriculum at the University of Arkansas does an excellent job, in my opinion, of preparing students for the CPA exam and in changing parts of the curriculum or course organization, that preparation should not be sacrificed. The areas of focus, then, should be in setting up the program to provide the same level of technical knowledge while also preparing students for the business world with technological and soft skills.

*The accounting technology course*

The most notable trend in the synthesis section was the amount of areas that the Accounting Technology course covers. It is primarily a technology course but it also manages to cover business processes, internal controls, data visualization, and much more. As previously stated, I think working with the business college to allow that course to fulfill the business core requirement of Business Information Systems for accounting students would be beneficial in improving the technological and analytical skills that accounting students will need in the future. The Accounting Technology course as it stands will need to be adjusted to accommodate some areas that will need to be covered from the Business Information Systems course and to remove some concepts to be added to a separate course. Essentially the Accounting Technology course

must be split into two courses, the first dealing with more of the systems and data management topics from an accounting perspective and the second dealing with more of the analytical and more advanced technological concepts. By doing this, there could be more space during the semester to teach these topics and in the structure of the courses allow for more assignments that work on the soft skills of accounting students. This is especially important in the second proposed course, since a large part of data analytics is communicating the analysis to an audience that may not understand the underlying data. Mechanics and examples from Denison (2018) will be helpful in designing a structure for the course.

*Integrating skills into existing courses*

Beginning courses in the accounting curriculum are theory based for good reason, they provide the foundational knowledge to learn the more advanced topics. Advanced courses such as the Intermediate Accounting courses and Tax courses provide a substantial amount of information that is critical in understanding the various aspects of accounting theory. With this much important information to cover, these courses are difficult to add on to thanks to the barriers Participant 1 identified: time and class size. However, a small change in these courses can make a large difference. For example, in the Accounting Principles I and II courses, most of the problems are solved by hand. I think it would be reasonable to incorporate some minimal technology skills into that course. Not necessarily analytics, but simple spreadsheet problems, because the reality of accounting is that most of the journal entries and t-accounts are no longer kept on paper, but rather in spreadsheets or databases. A small change to the Principles courses could help set up the Excel skills necessary to move into the higher level courses. In terms of the advanced courses, a similar strategy should be implemented, though the focus should be on the content. In these higher level courses, it becomes important also to improve communication and problem solving skills. For the Intermediate Accounting courses, students could be put in to groups much like in Denison (2018). Then the structure of the course could be organized where part of the class sessions are focused on teaching the concepts and the other part could be dedicated to working on an ongoing problem for a fictional company that each group is assigned to. This is difficult to do in the short term because of the size of the classes involved, so this should be more of a long term goal for the department.

The Auditing course was brought up by a few of the participants as one that was odd and not quite effective in preparing students for audit work. In this course as well, there is little room to add extra mechanics due to the large class size and the amount of information to cover. This is where I believe the idea from Participant 4 can make the most difference, that idea being approaching accounting as a trade. Auditing skills can really only be learned through applying them, so one solution to improving preparing students for audit work is to turn tests into more application based assessments and perhaps to help reinforce the information that underlies those applications, include quizzes that are more aligned with the traditional assessment style. While this may improve auditing skills, it is simply a lot to ask to implement any other skill set. In this case, perhaps the current system in encouraging students to take internships to learn how an audit is done is the best way to learn in the short term. Participant 3 spoke of their internship progression and how useful it was in allowing them to see how all of the accounting functions fit together in a business.

The Taxation courses also have an enormous amount of information to cover. Participant 2 brought up an interesting solution to this in what I think would be more a long term goal. The solution they suggested was possibly implementing “non-credit requirements” that can be

fulfilled by extracurricular activities. Beta Alpha Psi for example would be a good area to improve networking skills and potentially résumé preparation. For students in tax, it is difficult to get an idea of what actually preparing a tax return would be like, because as was pointed out by almost all of the participants, problems in class have definite answers. In the real world, clients will come in with an unorganized pile of receipts and W-2s and other forms that tax accountants will have to sort through and try to find the lowest tax liability or highest refund that is allowed. In my experience, the Volunteer Income Tax Assistance (VITA) program is the best way to receive this experience. VITA allows for students to work with tax software and the people whose tax returns are being prepared. This works on the individual tax side of the area of taxation, in corporate tax there is no such program. For corporate tax returns, perhaps a different approach can be taken in a course that could address the technological and soft skills.

*The capstone accounting course*

Accounting as a profession is more of a relationship heavy profession than specialized knowledge. Granted there is a good amount of knowledge and skills that only accountants have, the interactions that accountants have with non-accountants are just as important. This proposal is based on the idea that each accounting function, financial, tax, audit, and managerial, is connected. A course should be created that allows students to apply their technical knowledge in a way that works on their soft and technological skills. Denison (2018) provides a good example, but it only worked on the managerial function. Ideally, this course would open to all accounting students, however at first students would need to apply for the course in order to enroll. The course should have a small class size and allow for approximately three or four groups. Students in this course would apply their knowledge from all four of the accounting areas to essentially take a company through a fiscal year. As in Denison (2018), students would complete a skills survey to gauge what they are most proficient in and students would then be assigned to groups that are balanced. This builds on the ideas in Kleinman et al. (2002) that teams are a good way to transfer knowledge and learn. Students could then assign themselves to certain accounting functions and work on data that is provided for them. This data however should not be complete and "clean." Instead students should have to research into the data and clean it, using some data management skills, another way they could research is to inquire of the data owner. This is a tricky aspect as the professor could be the data owner and would have to make sure that the information is not necessarily easy to get to. As Participant 1 mentioned in their interview, tax clients sometimes don't want to tell their accountant everything, so it's on the accountant to ask the right questions and research to figure it out. Assignments and grades would then be based on deliverables, either in written reports or in oral presentations. Email assignments could also be used as smaller assignments to make sure that all aspects of the students' business writing are well developed. This course is a vast undertaking and can in no way be implemented in the short term because it needs to be carefully planned. As a capstone course it would be necessary for all accounting majors to complete this course in order to graduate. However, if the goal is small class sizes, this will be difficult to do. Instead, the department could consider adding other options such as the Accounting Ethics course or another course that would allow those students who fail to enroll in this capstone course to still fulfill that requirement. For Honors business students it could be another way to fulfil an Honors Thesis requirement, so perhaps the best way to implement this course initially is to offer it exclusively to Senior Honors Accounting students.

*Proposals in Summary*

The accounting department does an excellent job in preparing accounting students for the accounting knowledge they need to either pass the CPA exam or go into their careers, however a few changes need to be made to help them prepare for the technological and interpersonal aspects of the profession. First, the Accounting Technology course should be split into a data management and systems focused course, specifically in business processes and the underlying technological skills that lead to analytics, and an analytics and advanced technology course. The first course should attempt to fulfill the requirements of the current Business Core course Business Information Systems. Both of these courses should be taught from an accounting perspective. Second, small incremental changes as to the assignments and structure of the existing accounting courses should be made to improve the technological skills in the principles courses. In advanced courses, content should still be the focus, but perhaps a better approach to delivering the content could be found, students in Intermediate Accounting courses working in groups more, for example. Third, the department should look into the possibility of "non-credit requirements" as an incentive to increase student involvement in ongoing learning and application, in organizations such as VITA. Finally, the department should attempt to create a class as described above where accounting students can apply the advanced knowledge they have gained in their courses and understand how all of the accounting concepts work together in a business. This is not an exhaustive list of ways that the department can change, but after the research I have conducted, I believe it is an attainable list and one that should be pursued to the benefit of the accounting students at the University of Arkansas.

**Suggestions for future research**

An interesting topic in terms of technology and soft skills is the use of social media in the professional environment. There is not much research on the use and effect of social media and other platforms on accounting, but the International Journal of Accounting issued a Call for Papers on the impact of social media on accounting and auditing. The topics enumerated in the document involved more of social media's impact on the technical aspects of accounting and auditing, but it would be equally interesting to know how social media impacts the interactions and relationships in accounting.

Appendix

**Table 1**

| Name and acronym | Description |
|---|---|
| **Advanced industrial robotics (AIR)** | Advanced industrial robotics is the branch of robotics dedicated to the development of robots which, through the use of sensors and high-level and dynamic programming, can perform 'smarter' tasks, that is, tasks requiring more flexibility and accuracy than those of traditional industrial robots – for example, a robot that can handle lettuce without damaging it. The term applies to digitally enabled robots working within industrial environments that are equipped with advanced functionality (for example, sensors detecting potential collisions, and halting or performing a programmed motion with a very limited lag), allowing them to deal with less structured applications and, in many cases, collaborate with humans (instead of being segregated from them). |
| **Additive manufacturing (AM)** | Additive manufacturing is a technique using the super-imposition of successive layers to build a product. It is additive in the sense that products and product components are built up rather than cut out of existing materials – subtractive manufacturing. The key prerequisite of the AM process is that products can be digitally modelled before being physically generated. The 'revolution is … the ability to turn data into things and things into data' (Gershenfeld, 2012). |
| **Industrial internet of things (IIoT)** | Sensors applied to the manufacturing industry create cyber-physical systems where the information collected from the sensors is fed, through the internet, to computers in order to gather data about the production process and analyse these data with unprecedented granularity. In advanced cyber-physical systems, a whole factory can be digitally mapped and enabled using such sensors. |
| **Electric vehicles (EVs)** | Electric vehicles are vehicles for which the main system of propulsion depends on electricity and not on fossil fuel. The vehicle relies on the storage of externally generated energy, generally in the form of rechargeable batteries. The main current example is the battery electric vehicle. |
| **Industrial biotechnology (IB)** | Industrial biotechnology is the use of biotechnological science in industrial processes. Modern biotechnology is based on the most recent scientific insights into the specific mechanisms of biological processes within living organisms (for instance, through systems genomics and metabolomics research). These are used to design processes in industry using yeasts, bacteria, fungi and enzymes (biological catalysts that improve reaction processes and that are relatively easy to obtain) to produce biomaterials and biofuels. |

Source: Eurofound (2018), *Game changing technologies: Exploring the impact on production processes and work* Publications Office of the European Union, Luxembourg. p. 3.

**Table 2**

| Technology | Estimates of potential market size |
|---|---|
| **AIR** | Impact on global market of between USD 1.9 trillion and USD 6.4 trillion (€1.61 and €5.42 trillion as at 15 December 2017) per year by 2025 (RAS 2020, 2014, p. 9) |
| **AM** | Estimates of the global AM industry vary from USD 1.7 billion (€1.44 billion) (Roland Berger, 2013) to as much as a turnover of USD 500 billion (€423 billion) per year (Manyika et al, 2013) |
| **IIoT** | Deployment in the automotive industry only: USD 210–740 billion (€170–€626 billion) value by 2025 |
| **EV** | Electric car stock at global level will be between 9 million and 20 million by 2020 (10% of the market) |
| **IB** | The EU market for IB-derived products is expected to increase from €8 billion in 2013 to €50 billion in 2030 (BIO-TIC, 2015) |

Source: Eurofound (2018), *Game changing technologies: Exploring the impact on production processes and work* Publications Office of the European Union, Luxembourg. p. 5.

**Table 3**

| Section | Section time | Multiple-choice questions (MCQs) | Task-based simulations (TBSs) | Written communication |
|---|---|---|---|---|
| AUD | 4 hours | 72 | 8 | — |
| BEC | 4 hours | 62 | 4 | 3 |
| FAR | 4 hours | 66 | 8 | — |
| REG | 4 hours | 76 | 8 | — |

Source: American Institute of Certified Public Accountants. (2018). CPA Exam Study Materials. Retrieved from https://www.aicpa.org/becomeacpa/cpaexam/examinationcontent.html

Previously the number of multiple choice questions for the four sections were 90, 72, 90, 72 respectively and the number of task-based simulations were 7, 0, 7, 6 respectively (Tysiac, 2017).

**Table 4**

| | CLASSIFICATION | ROLE IN EDUCATION PROCESS |
|---|---|---|
| **PARTICIPANT 1** | Educator | Assistant Professor, specializes in corporate taxation. |
| **PARTICIPANT 2** | Educator | Professor and Department Chair, specializes in risk factors, corporate governance, and ethics. |
| **PARTICIPANT 3** | Professional | Recent University of Arkansas graduate, currently working in a local office of a Big 4 firm in first year as a risk assurance associate. |
| **PARTICIPANT 4** | Professional | Partner at a local office of a regional public accounting firm |
| **PARTICIPANT 5** | Educator & Professional | First year instructor in accounting, formerly partner at a local office of a Big 4 firm |

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