Introducing Digital Acumen Into Accounting Information Systems Courses: A Design Science Approach

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Abstract

Business school accreditors and the accounting profession, through its credentialing examinations, increasingly ask accounting faculty to include digital acumen (an ability to leverage digital innovations) in accounting courses. Yet many instructors struggle to identify which topics to prioritize and how to cover those topics given time and resource constraints. In this paper, I use a design science approach to introducing or reinforcing digital acumen coverage in accounting information systems (AIS) courses. AIS educators can adopt any of the outputs I developed or adapt the design science approach I model herein to develop their own outputs.

Keywords
Accounting curriculum, design science research methodology, digital acumen, emerging technologies

In this paper, I use a design science research approach to develop teaching materials that introduce digital acumen into the AIS curriculum. I know of no other work that applies this approach to help instructors teach these topics. The approach I present yields learning artifacts that other instructors can use and provides a model for instructors who want to develop their own specific learning artifacts.

Digital Acumen Needed in the Accounting Profession

Understanding technology innovations and how to use them has become essential to the accounting profession. Certified Public Accountants (CPAs) need strong digital acumen (AICPA, 2022b; Tosczak, 2023), defined as "knowing how to leverage digital innovations" (AICPA & NASBA, 2021, p. 7) The post-2023 revised CPA exam will reflect a recognition of the impact of technology in addition to its traditional core of accounting, auditing, and regulation (AICPA, 2022b). Similarly, both the Institute of Internal Auditors'(IIA) Certified Internal Auditor (CIA) exam and the Institute of Management Accountants' (IMA) Certified Management Accountant (CMA) exam identify critical areas of focus on technology and digital acumen (IIA, 2019; IMA, 2020).

In addition to credentialing exams, AACSB International (AACSB), an organization that accredits business schools worldwide, requires coverage of evolving technology concepts (AACSB, 2021). For accounting students and faculty, AACSB Standard A5 requires technology agility (Riley et al. 2022) as follows: "Learner experiences [must] integrate … business acumen… information systems and processes, and data management and data analytics tools … [and] [g]raduates [must] understand the capabilities of these tools along with the[ir] impact and the associated risks and opportunities" (AACSB 2021, p. 21).

Including Digital Acumen in AIS Courses

Despite the profession's expectations, Coyne et al., (2016) find that AIS courses tend not to connect important information systems trends that occur in practice to curricula. Another key study found that many schools failed to cover key topics such as predictive analytics, system and organization control (SOC) engagements, digital acumen, IT governance, and IT risks and controls (AICPA & NASBA, 2021). Many schools expect the undergraduate AIS course to cover all technology topics; a burden that is becoming overwhelming as the breadth and depth of technology continues to increase.

In addition to digital acumen, many schools expect the AIS course to include flowcharting, internal controls, business processes (often including enterprise resource planning software and enterprise risk management frameworks), and database theory with applications (Garnsey et al., 2019). The importance of digital acumen and the time constraints in an already overloaded AIS course combine to create a challenge: how to cover digital acumen and technology agility effectively and efficiently.

In this paper, I use a design science research approach to develop teaching materials that introduce digital acumen into the AIS curriculum. I know of no other work that applies this approach to help instructors teach these topics. The approach I present yields learning artifacts that other instructors can use and provides a model for instructors who want to develop their own specific learning artifacts.

Design Science Research Methodology and AIS Education Research

Design science research methodology (DSRM) creates artifacts for a practical purpose (Hevner et al., 2004). DSRM artifacts have two important attributes; they are relevant and novel. To be relevant, the artifact must solve an important problem. To be novel, it must address a problem in a unique and innovative way or in a more efficient or effective manner (Geerts 2011). Sutton et al., (2021) explain that design science contributions are either improvements (new solutions for known problems) or inventions (new solutions devised for new problems).

Although DSRM has made valuable contributions to information systems research (Barata et al., 2023), educators are only now using it to enhance students' understanding and provide tools that facilitate efficient and effective learning activities (Hevner & Vom Brocke, 2023). DSRM is consistent with the science of learning, or "the scientific study of … learning … describing, understanding, or improving learning across developmental stages and diverse contexts" (Privitera et al., 2023, p. 13).

Using the science of learning and DSRM approaches applied to accounting issues by Geerts (2011) and Sutton et al. (2021), I developed an artifact, a table of digital acumen resources, that can increase AIS courses' practical relevance to the accounting profession's needs. To add digital acumen content in their courses, AIS educators can adopt any or all elements of this artifact. Alternatively, they can follow the approach I describe in this paper to create similar artifacts that meet the needs of their specific curricula.

Developing Digital Acumen Artifacts for the AIS Course

I developed these artifacts during the 2021-2022 and 2022-2023 academic years, while teaching at a mid-sized private university in the Mid-Atlantic region. Our program has AACSB accounting accreditation, and thus is subject to AACSB Standard 5. Our undergraduate AIS classes range from 16-30 students per section. I have been teaching AIS for more than fifteen years, but only recently learned about DSRM as a curriculum innovation approach. I believe it provides a logical and intuitive way of planning and implementing accounting curricula that other instructors can readily use in their courses.

The first three steps in DSRM lead to the development of specific artifacts (Hevner et al., 2004). I wanted to create artifacts that would help students develop levels of digital acumen sufficient to enter the accounting profession and succeed on its credentialing exams.

Step 1: Problem Identification and Motivation

I reviewed the AICPA & NASBA (2021) curriculum gap analysis to identify topics missing from our program's curriculum and my AIS course. Since the professional accounting organizations each emphasize different areas of digital acumen, and accounting students pursue a diverse set of careers, I wanted to consider both of these stakeholders' interests as I constructed the artifacts.

Most of our accounting graduates start their careers with international, national, or regional public accounting firms, which led me to evaluate AICPA resources, because it is the professional organization most closely associated with public accounting firms. Its Technology Content Suite (AICPA, 2022a) includes the following topic areas: artificial intelligence (AI), blockchain, cybersecurity, information security, data analytics, business intelligence, governance, risk and control, practice management, and robotic process automation (RPA).

My undergraduate AIS course, includes risk management, governance, and the efficiency and effectiveness of business process controls. I did not believe practice management would be an essential topic for new graduates. Thus, I concluded that the remaining topics, including AI, blockchain, cybersecurity, information security, data analytics, business intelligence, and RPA would satisfy the DSRM Step 1 requirement of motivation.

My review of the technology expectations of other professional accounting bodies validated my choices. Although no one-to-one mapping between the AICPA (2022a) and other organizations' technology topic specifications exists, the IIA, IMA, and AACSB content guidelines are generally consistent with each other. For example, the CIA exam specification includes business processes, risks and controls, data governance, data analytics, information security, cybersecurity risks, and emerging technology practices (IIA, 2019). The CMA exam tests knowledge of governance, risk, compliance, system controls, and data analytics (IMA, 2019). AACSB Standard A5 expects graduates to have an understanding of security concerns, information systems and processes, and data management and data analytics tools (AACSB, 2021).

Step 2: Identify Objectives of a Solution

I reviewed the skill level expectations for the CPA, CMA, and CIA exams, noting that both the CPA and CIA exams test technology content at the remembering and understanding level of Bloom's Taxonomy (Anderson et al., 2001; Shabatura, 2014). For example, remembering and understanding are 55-65% of the information systems and control (ISC) section of the new CPA exam, and are also 55-65% of the skill allocation (AICPA, 2022b). Anderson et al. (2001) note that the remembering and understanding skill level is lower than either application, analysis, or evaluation skill levels, but can be a prerequisite to those higher skill levels.

I decided to cover the new digital acumen material early in the course so I could reinforce it later in the course with hands-on activities that provide higher skill levels of learning (application, analysis, and evaluation). Thus, the learning objective for the new material focuses on the first skill level of understanding.

Since non-accounting majors also enroll in the class (as an elective), I expanded the learning objective to include broader business contexts, not limiting the setting to accounting issues. I concluded Step 2 by defining the learning objective for this initiative as follows: To understand prevailing technological trends and identify their impact on accounting and business.

Step 3: Design and Development

I began this step by evaluating my existing course coverage, active learning exercises, and cases to ensure that they were truly value-added. I found that focusing on areas of duplicated content was productive. In my class, such content included a COSO ERM case, a case on IT governance, and two class exercises on control weaknesses. Removing these duplicate topics or activities freed up about 30 minutes per topic (two to three hours of class time) which become available for covering the new topics I had identified in Step 1.

I created short digital acumen assignments and discussions to use early in the course. I intended these assignments to create scaffolding (Vygotsky & Cole, 1978) that would support later assignments and reinforce

digital acumen concepts throughout the semester. I adjusted each assignment to fit within the confines of the time I had made available, resulting in assignments for five topics (of the seven I had identified in Step 1): AI, RPA, blockchain and cryptocurrency, cybersecurity, and data analytics.

As I selected and adjusted assignments, I found some resources (AICPA, 2022a) to be quite long or dated. Having students read these documents in their entirety would be unreasonable given other course demands. For many of the topics, I found short (3-7 minutes) videos to use instead.

Part of the iterative development process was capturing students' opinions of the videos to determine whether such a short exposure would help develop digital acumen; thus, I administered short (2-3 minutes) surveys to assess students' knowledge and understanding of each topic and video (the survey appears in the Appendix). Since self-reflection on assignments allows students to discover the relevance and significance of the content being covered (Upadhyay & Paul, 2019), I believed these short surveys gave students time to reflect and gather their thoughts.

After reviewing the student responses, I decided to use a wider variety of resources (including articles, videos, PowerPoint summaries, and self-reflection writing). Table 1 summarizes the artifacts I developed for AI, RPA, blockchain and cryptocurrency, cybersecurity, and data analytics.

Table 1
Digital Acumen Artifacts
Panel A: AI (Artificial Intelligence)

Articles Assigned	Additional Articles	Video(s)
Chan, K. K., & Kim, T.(2020). The artificially intelligent audit function. Nathan, B. (2021). AI: A blessing and a curse. Patrick, B. (2020). Technology Q&A: What is artificial intelligence?	Alcantara, A. (2023, January 11). Is it human or AI? New tools help you spot the bots. Castelluccio, M. (2022). The two faces of deepfakes. Coffee, P. (2022, October 26). Simulated stars appear in ads without consent. Kellogg, K.C., & Valentine, M. A. (2022, November 9). Five mistakes bosses make when introducing AI—and how to fix them. Munoko, I. (2022). Implementing artificial intelligence: Capabilities and risk. Stern, J. (2022, October 20). Some AI images make you go 'Aiiiee!'	MarketWatch. (2019). Here's how artificial intelligence powers bike sharing.[a] OpenAI. (2022). DALL-E 2 explained. reAlpha. (2022). Elon Musk held hostage in warehouse (will he comply?).

[a]In the Spring 2023 semester, I replaced this with next two videos shown in this column.

Panel B: RPA (Robotic Process Automation)

Articles Assigned	Additional Articles	Video(s)
Alvarez-Dionisi, L. E. (2021). To bot or not to bot? That is the question for digital banking. Drew, J. (2020). Technology lessons from the pandemic – and beyond. Kogan, G., Myers, N., Gaydon, D. J., & Boyle, D. M. (2021). Advancing digital transformation.	Anonymous. (2021, December 30). Overheard. Eaton, T. V., Arlson, A., & Zhang, J. (2022). Building a bot. Roose, K. (2021, March 7). The robots are coming for Phil in accounting.	UiPath. 2020. UiPath invoice processing with human assistance.

Table 1 (continued) *Digital Acumen Artifacts*
Panel C: Blockchain and Cryptocurrency

Articles Assigned	Additional Articles	Video(s)
Eaglesham, J. (2022, December 23). SEC heightens scrutiny of auditors' crypto work. Maslova, N. (2018). Blockchain disruption and opportunity Vigna, P. (2021, December 6). What to know about cryptocurrencies.	Alverez-Dionisi, L.E. (2021, January 13). Technology-based trust with blockchain. Anonymous. (2022, November 18). Heard on the street: For crypto, transparency may not always help. Benjamin, N. (2021). How effective is blockchain in cybersecurity? Bousquette, I. (2022, December 16). Blockchain fizzles in shipping. Mackintosh, J. (2022, November 23). Crypto's systematic troubles are far from over. Maurer, M. (2021, July 19). Accountants, lawmakers urge rules on crypto accounting. Roose, K. (2022, March 20). The late comers guide to crypto. Vigna, P. (2022, August 23). Wall street firms turn to blockchain. Wang, J. (2022). The bleeding edge: The impact of cryptocurrency and its carbon footprint.	Stern, J. (2021, December 13). NFTs, crypto wallets, and more explained by putting my son's art on the blockchain.

Panel D: Cybersecurity

Articles Assigned	Additional Articles	Video(s)
Bhattacharyya, S. (2021, September 9). Why hackers love smart buildings. Dziwa, A. A. (2022). How social engineering bypasses technical controls. Trepp, D., & Schmidt, J. (2021). The gentle art of password management.	Jackson, R. A. (2018). Pulling strings. Marson, J., Schechner, S., & Cullison, A. (2016, October 20). Hackers evolve to serve the Kremlin. McMillan, R. (2016, May 20). Hacker holds computers for ransom. McMillan, R. (2018, December 10). Stolen personal data on sale for a few bucks. McMillan, R. (2022, October 20). Online risks rise for most users. McMillan, R. (2022, October 21). Crypto scam costs victims hundreds of millions in losses. Rosenbush, S. (2021, December 8). To thwart hackers, stop counting on users. Rundle, J. (2022, July 6). Login risk seen for businesses. Sidel, R. (2015, December 21). Hackers exploit staffers at banks.	Jimmy Kimmel Show. (2015). What is your password? Oracle Mind. (2017). This is how hackers hack you using simple social engineering. Vexel. (2015). How to mod any toaster to control PC games in 3 easy steps.

Panel E: Data Analytics (Spring 2022 Only[b])

Articles Assigned	Additional Articles	Video(s)
Dzuranin, A. C. (2022). Explanatory data visualizations. Geerts, G. (2021). Drive business success with data analytics. Overberg, P., & Hand, K. (2021, December 9). The data issue…scale model.	Chartered Professional Accountants of Canada. (2019). *A CPA's introduction to AI: From algorithms to deep learning, What you need to know*. Eaglesham, J. (2021, December 13). When companies fire their auditors, timing is clue to future trouble. El-Wakeel, F. (2021). Ethics and data analytics go hand in hand. Maurer, M. (2021, June 15). PwC to spend $12 billion on hiring, expanding expertise in AI, cybersecurity.	KPMG. (2017). Audit 2023: Audit technology fit for the future.

[b]n the Spring 2023 semester, I replaced these assignments with new textbook coverage of data analytics; thus, the subsequent efficacy analysis excludes this topic.

Efficacy

DSRM's fourth and fifth steps are demonstration and evaluation. To show that this approach met the learning objective (To understand prevailing technological trends and identify their impact on accounting and business), I had students answer a brief questionnaire (included in the Appendix) on the technology topics. The first four questions ask for a level of agreement on an 11-point Likert scale between (-5) for strongly disagree to (5) for strongly agree. Question 5 was open-ended, soliciting specific feedback on the video(s).

Table 2 summarizes the results of the student surveys for Questions 1-4 for the Spring 2023 semester (results from the previous term were almost identical).

Table 2
Questionnaire Debriefing Responses[a] for Each Topic

	M	*SD*	*T[c]*
Topic: Artificial Intelligence *(n = 30[b])*			
1. I was knowledgeable on this topic before we covered it in class	2.02	1.77	6.23***
2. Our class's coverage increased my knowledge of this topic	3.98	1.24	17.66***
3. Watching the video(s) increased my knowledge of this topic	3.63	1.41	14.14***
4. I found the video(s) to be interesting and engaging	4.23	1.03	22.47***
Topic: Robotic Process Automation (n = 28[b])			
1. I was knowledgeable on this topic before we covered it in class	1.04	1.90	2.89**
2. Our class's coverage increased my knowledge of this topic	4.32	0.86	26.50***
3. Watching the video(s) increased my knowledge of this topic	3.98	1.38	15.30***
4. I found the video(s) to be interesting and engaging	3.59	1.68	11.28***
Topic: Blockchain/Cryptocurrency (n = 31[b])			
1. I was knowledgeable on this topic before we covered it in class	0.27	2.64	0.58
2. Our class's coverage increased my knowledge of this topic	4.02	1.33	16.78***
3. Watching the video(s) increased my knowledge of this topic	3.92	1.59	13.71***
4. I found the video(s) to be interesting and engaging	4.13	1.59	14.44***
Topic: Cybersecurity(n = 29[b])			
1. I was knowledgeable on this topic before we covered it in class	2.38	1.92	6.69***
2. Our class's coverage increased my knowledge of this topic	4.31	0.93	24.96***
3. Watching the video(s) increased my knowledge of this topic	4.02	1.39	15.54***
4. I found the video(s) to be interesting and engaging	4.71	0.59	42.93***

[a]To debriefing questions (1-4) using an eleven-point scale on which -5 = Strongly Disagree and 5 = Strongly Agree.
[b]From two sections of AIS undergraduate students at the author's university for the Spring 2023 semester.
[c]T-tests with unequal variances, where the mean is statistically different from zero.
**p < .01.
***p < .001.

In the Spring 2023 semester, I replaced the Data Analytics assignments with coverage of that topic included in a new textbook. Question 5 (see Appendix) asked students to provide open-ended responses in which they identify specific technology concepts or examples that the video(s) reinforce. Table 3 includes a sample of those responses for each of the five digital acumen topics.

Table 3
Selected Student Open-ended Responses to Debriefing Survey Question 5, by Topic

Artificial Intelligence

The video of Dall-E was showing how if the correct information was put into the AI, it could generate anything; The Elon Musk video was showing an example of deepfakes; Both videos show how smart AI tech is but only if used and programmed with the right intention.

A specific concept this video [Dall-E2] reinforces is the power AI has to take simple text and turn it into photogenic images. These AI systems can also fill in or replace parts of images. It not only learns about individual objects, but also learns the relationship between multiple objects and if there is not one, it can create one.

Robotic Process Automation

The video shows practical applications for RPA in a business environment. The video also showed how RPA can help to automate tedious tasks that would be completed by staff otherwise. The video shows that very little intervention is needed from employees after the RPA is in place, only needing someone to monitor exceptions.

I learned that RPA is used by many companies because after being set up, its accuracy and speed is basically unmatched. Another major reason they use this is because it saves them a fair amount of money. It also works around the clock and can constantly process information.

Blockchain/Cryptocurrency

The video really helped me understand the whole idea of NFTs, blockchains and using cryptocurrencies and how it all works together. And, why people would want cryptocurrencies and NFTs.

A blockchain is a decentralized network. Blockchain is like a bunch of computers on the same network. NFT and cryptocurrencies need a digital wallet. The purpose of NFTs is to get in certain clubs, make money, trade.

Cybersecurity

This video [Social Engineering] reinforces how important it is to stay cautious of what you are putting on the internet. It is fairly easy as seen in the video to get one's personal information with just a little persuading and other factors like a crying baby for example. It is important to keep changing your password and to have a double authentication when logging into an account.

I found out that you can get hacked with a phone call. I found out that people are very willing to give their passwords away. I found out about the types of behaviors that will encourage hackers to cyberattack you.

I asked colleagues who teach AIS at other universities to review this approach. I summarized their comments in Table 4.

Table 4
Faculty Reviewer Comments

Faculty member from a large, midwestern public university

"I think your approach is a creative way to overcome the challenges educators face when trying to teach new and relevant content. You identify a packed AIS curriculum as one of the impediments that your approach overcomes, but it also overcomes the course text/material publication cycle which is definitely not designed to add emerging technologies expeditiously. Secondly, the questions posed to students before they interact with the material are good takeaways that students can use after the course to evaluate other emerging technologies."

Faculty member from a large, western public university

"This is a great approach. I do something similar in that I require my students to research the topics and do a presentation. The benefit of using this new approach is that occasionally students' research misses the mark so giving links to the material results in more consistent learning."

Faculty member from a large, southeastern public university

"For my classes I plan on phasing this in over a couple of semesters. Starting with this fall semester I plan on showing videos in class and providing the students with access to some articles that will be optional for them to read. We will also briefly discuss the topics in class. In future semesters, I plan on making more readings and the responses mandatory."

Insights Developed and Implementation Guidance

Students completed this assignment outside of class. Not requiring each student to read all three articles was a concession to their workload. Asking students to prepare the topic for class discussion using the perspective of one article (and not three) yielded a more diverse class discussion since all students had not read the same article. Participation in the class discussion was voluntary, but helped all students develop insights based on the questions discussed. Although I did not quiz students on their outside readings, instructors could certainly do so. I required students to submit their answers via our learning management system (Canvas) before the class discussion. I graded student submissions for completion, and I checked that students answered them thoroughly and relevantly.

To facilitate class discussion, I created short PowerPoint presentations that highlighted elements of the three articles and summarized other relevant resources. I made the resources available in a Canvas discussion board after the class coverage so students could refer to them in the future. The discussion board also included a forum in which I posted the video link and additional articles and resources on the area. In the remainder of this section, I provide detailed notes on my students' experience with each artifact element to help other instructors use them effectively in their courses. Where relevant to the discussion, I mention means of students' responses from Table 2.

Artificial Intelligence

In the class discussion, students often discussed the difference between artificial general intelligence and narrow artificial intelligence. They also were interested in the various types of narrow artificial intelligence. Deep fakes really scared them, and they realized how much auditors and retailers rely on AI.

I explained how AI differs from RPA (a future technology topic) and that even COSO's Enterprise Risk Management Executive Summary (COSO, 2017) mentions how AI and automation will impact future risk management. This was especially pertinent because I have students complete a case on the 2017 COSO ERM Framework later in the course. Discussing how AI generates vast amounts of data that businesses analyze also previews coverage on data analytics that I include later in the course.

Students reported feeling more knowledgeable of Artificial Intelligence before discussing it in class during the Spring 2023 ($M = 2.02$) than they had in the previous year ($M = 1.48$). I believe the widely reported November 2022 release of ChatGPT contributed to this difference. Although I did not change any of the assigned articles, I did update the PowerPoints and changed videos (noted in Table 1, Panel A) to reflect the new pervasiveness of AI. I found these videos referenced in Coffee (2022) and Stern (2022). Specifically, I used OpenAI (2022) as an overview of generative AI and reAlpha (2022) for deep fakes, which had been a concern expressed by students in 2022. Captain (2023) mentioned generative AI (such as Dall-E2) as a skill with which everyone in the workforce should be familiar.

Student ratings of the AI videos were more positive ($M = 4.23$) than those of the video I used in Spring 2022 ($M = 3.88$). Students' insights about artificially-created images (prompted by the new videos) in the Spring 2023 semester helped them analyze an article I introduced near the end of that semester (Alcantara 2023). After reading that article, students noted specific red flags that might identify fake images.

Robotic Process Automation

In the class session, students discussed the displacement of human jobs of all skill levels. Many students who were dual accounting and finance majors found the digital banking topics fascinating and mentioned them multiple times. I used the UiPath (2020) video to explain how RPA bots differed from machine learning (for example, RPA bots cannot handle exceptions on their own). At the end of the semester, students worked with UiPath and noted this in their own programming runs. The video demonstrates UiPath's automation with SAP tasks, and students noted how it could have automated transactions they had created in SAP. It also displays a flowchart, one of the first tasks students complete in the course.

COSO (2017) describes how automation (such as RPA) will impact future enterprise risk management, a topic that arose during class discussion, with students mentioning the inaccurate responses, impact on networks, and costs of these technologies.

The Spring 2023 class discussion on this topic was similar to the previous year's, except that the excitement around RPA was somewhat subdued. AI likely stole the spotlight from RPA (Marr, 2023).

Blockchain and Cryptocurrency

Many students noted that, although they had heard terms such as "blockchain," "cryptocurrency," and "NFT," they did not understand the concepts before reading the assigned articles (see Table 1, Panel C). In class, I explained how technology creates blockchains using a diagram in Alverez-Dionisi (2021). Most of the ensuing class discussion centered on cost savings in recording transactions, auditing efficiencies, and supply chain management. Students also shared their own experiences buying cryptocurrencies.

During the 2022 class, I added a just-published article (Vigna and Needleman, 2022) about a cryptocurrency theft carried out using social engineering. In the class discussion on cybersecurity, I mentioned that social engineering is the primary culprit in target breaches. Since most students had missed a related question on their mid-terms, I used the article and discussion to reinforce this point.

I noticed that student interest in blockchain and cryptocurrencies waned in 2023. Based on student comments in the class discussion, I concluded that the FTX implosion contributed to this decline in interest. Thus, I used FTX as the example firm in our class discussion of enterprise risk management.

Cybersecurity

In the class discussion, many students mentioned Bhattacharyya (2021) and confessed they had no idea that office buildings could have so many cyber vulnerabilities. This allowed me to discuss the Internet of Things (IoT) and cybersecurity by tying in the Vexel (2015) video, which discusses how to connect a toaster to a computer using a USB connection. Students realized that hackers can get into building networks the same way.

The Jimmy Kimmel Show (2015) video is dated, but it is a humorous demonstration of social engineering. Although the video ostensibly investigates the strength of logical security (such as passwords), the interviewer employs two forms of social engineering; pretexting (lying to gain access to privileged data) and *quid pro quo* (pretending to provide something in exchange for the target's information.) One student noted, "People are extremely vulnerable to social engineering." In fact, the Director of the Cybersecurity and Infrastructure Security Agency (the top cyber unit of the U.S. government) said, "Cybersecurity is not about technology and it's not about code; it's about people" (Rundle, 2022).

In 2023, I kept the Jimmy Kimmel Show (2015) video and added Oracle Mind (2017), which a colleague recommended. In that course, students strongly agreed that these videos increased their knowledge of the topic (M = 4.02) and found them to be interesting and engaging (M = 4.71).

Data Analytics (Spring 2022 Only)

In recent years, many of our accounting and business classes have added analytics topics. Coming into the course, students felt more confident about this topic (M = 2.29 on survey Question 1) than any other, but also less engaged because it was not new to them. Many students chose the Overberg and Hand (2021) article over the other two. Perhaps the title seemed more novel than the others. Students found fascinating that the vastly different storage capacities structured and unstructured data need can create privacy and confidentiality concerns. The students also mentioned sustainability issues related to storing so much data on computer servers.

After I introduced the four categories of data analytics noted by the Chartered Professional Accountants of Canada (2019, pp. 17-18), students connected those categories to the KPMG (2017) video's examples of structured (sales records that contradict actual shipments) and unstructured data (drone video footage and behaviors observed in employee interviews) in doing descriptive and predictive analytics (and AI use in adaptive analytics). I believe that connecting analytics back to AI (the first digital acumen topic covered) helps students realize how many of these topics are related.

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Iterative Development Process

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DSRM is iterative, including evaluation of the artifact and communication that facilitates a "build-and-evaluate loop" (Geerts 2011, 144). Consistent with this practice, I adjusted content for the Spring 2023 term based on new publications and already-published papers I discovered while researching digital acumen and teaching the topic. Because data analytics became included as a distinct topic in recent AIS textbooks, I decided to remove it as a separate emerging technology topic (that is, I believed the topic had emerged). I used the 30 minutes thus made available to add additional guidance on an SAP case.

I plan to continue identifying relevant and engaging videos that apply these technology topics to other accounting and business issues. I believe that establishing this as an ongoing pedagogical practice will be key to enhancing students' digital acumen going forward.

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Limitations

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Although I found this approach useful in adding digital acumen topics to my AIS course, it has limitations. Instructors must continuously monitor what our profession deems as digital acumen. For example, when I began this project in late 2021, AI seemed to be in its infancy. That quickly changed when OpenAI released ChatGPT (Marr, 2023). I plan to remove AI as an emerging technology topic going forward and substitute another in its place. Although this can be an added burden to the instructor, the upside is that it forces the educator to stay current and design a dynamic AIS course.

Conclusion

Coverage of digital acumen has become a priority for accounting educators as AICPA/NASBA, the IIA, the IMA, and the AACSB require accounting graduates to have greater knowledge of and skills in using information technology. Accounting educators must determine what topics to cover and how best to cover them given multiple constraints. This paper demonstrates the use of DSRM to create an efficient and effective artifact that can meet these challenges. Student evaluations and faculty feedback validate this approach. Following DSRM can help instructors add digital acumen content to an already packed AIS class. Although I use DSRM here to add digital acumen to an AIS class, this approach is not limited to AIS courses. Instructors can easily apply this methodology to add content to other accounting, information systems and business classes.

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Appendix

Student Survey Questionnaire

Technology Topic: _____   **Student ID #** _____

Please place an "X" below statements 1 through 4 to indicate your agreement or disagreement with each statement.

1. I was knowledgeable on this topic before we covered it in class.
```
  -5            -3              0              3             5
  |-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
  strongly                                              strongly
  disagree                                              agree
```

2. Our class's coverage increased my knowledge of this topic.
```
  -5            -3              0              3             5
  |-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
  strongly                                              strongly
  disagree                                              agree
```

3. Watching the video(s) increased my knowledge of this topic.
```
  -5            -3              0              3             5
  |-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
  strongly                                              strongly
  disagree                                              agree
```

4. I found the video(s) to be interesting and engaging.
```
  -5            -3              0              3             5
  |-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
  strongly                                              strongly
  disagree                                              agree
```

5. What specific concepts/examples does/do the video(s) reinforce relating to this technology topic? (List at least three.)

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