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INFORMATION SYSTEMS EDUCATION JOURNAL

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Coin Counter: Gamification for Classroom Management

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Abstract

In recent years, gamification has been utilized in a number of different contexts, including educational applications. This paper describes a unique application of coin-based gamification classroom management system in undergraduate programming classes. The coin-based gamification allowed students to earn and spend coins as a form of classroom currency. Students earned coins for certain desired behaviors, which were above and beyond normal behaviors, and were able to spend the coins for things like an assignment or take-home exam due date extension. Survey based results were collected from 104 students and the results indicated that the gamification classroom management system was positively associated with classroom enjoyment, student participation, class strategy, perceived control, and classroom performance. Although the gamification classroom management system was related to desired outcomes, there were some negative outcomes, most notably the additional burden on the instructor that we highlight. A discussion, future pedagogical research thoughts, and recommendations for system improvements are provided.

Keywords: Gamification, classroom management, coin counter, assignment management, teaching technique, teaching learning

1. INTRODUCTION

Over the past few years, the concepts of gamification have been implemented in various industries as well as widely discussed in academic literatures. The context of gamification ranges from marketing (Hofacker et al., 2016; Moise and Cruceru, 2014), organization (Kim, 2013; Singh, 2012), healthcare (King et al., 2013; McCallum, 2012), information systems (Thiebes, Lins, and Basten, 2014), and education (Kapp, 2012; Dicheva et al., 2015).

Gamification is defined as "the use of game design elements in non-game contexts" (Deterding et al., 2011, p. 9). Examples of game mechanics include, but are not limited to points, levels, leaderboards, badges, onboarding, challenges, and quests (Zichermann and Cunningham, 2011). By integrating the 'fun' element into tasks, these game mechanics may help motivate users and promote engagement (Thiebes, Lins, and Basten, 2014). A recent literature review of empirical studies articulated that gamification promotes motivational affordances leading to psychological outcomes which, in turn, result in behavioral outcomes (Hamari, Koivisto, and Sarsa, 2014). In general, gamification provides positive effects, both behaviorally and psychologically to its users (Hamari, Koivisto, and Sarsa, 2014).

2. GAMIFICATION FOR CLASSROOM MANAGEMENT

Gamification has been used in the context of education. When properly implemented, "gamification can help enrich educational experiences in a way that students will recognize and respond to" (Deterding, 2012, p. 17). An empirical study found that achievement badges can be used to affect the behavior of students even when the badges have no impact on the grading (Hakulinen, Auvinen, and Korhonen, 2013). When applying gamification to software tutorials, students significantly completed tasks faster than those without gamification components and students reported the game conditions were more fun, enjoyable, engaging, and effective (Li, Grossman, and Fitzmaurice, 2012).

Although there have been positive outcomes, not all gamification efforts in the classroom have yielded desired consequences. One study found that students' engagement plateaued after a few weeks into the class. Once the novelty of the gamification had worn off, the high performers continued to engage in the gamified activities and the leaderboards became demotivating factors for many because they did not have a chance to catch up (Nicholson, 2013). Another study found that gamification did not improve educational outcomes and, in fact, decreased leaners' motivation, satisfaction, and empowerment (Hanus and Fox, 2015).

This paper presents a unique application of gamification in a higher-education context. In particular, in this classroom setting the mechanics involved students earning coins to help with student engagement, enjoyment, and managing classroom expectations. In the sections that follow, the specifics of the coin based gamification will be described.

3. COIN COUNTER

This particular application of gamification utilized a fictional "currency" based on earning and spending virtual coins. The coins are named either "Galleons" or "Doubloons" based on the class's theme (i.e., either "Wizard School" or "Pirates"). The class topic was undergraduate programming, which will be described in more detail, but is noted here since some of the examples covered relate to this material. As described in the next section, students earned coins in various ways and they had the opportunity to spend coins (for their benefit) in various ways.

Earning Coins

Students earned coins during the semester in many ways, however, not all activities were valued the same. Some activities were relatively easy to achieve, such as attending class or completing in-class challenges. Typically, these were worth 1 coin. Some activities were more effortful, such as providing written or verbal feedback concerning a team presentation or actively participating in class discussions. This kind of participation was typically awarded at least 2 coins (based on the quality and thoughtfulness of the feedback). Other activities involved spending time outside of class, such as attending department or school activities (e.g., a career development dinner). On top of that, students could frequently earn an extra coin by attending such events in their groups, by sending the instructor a picture of them at the activity holding their team banner.

Coins may also be awarded to students whose performance in regular activities was clearly outstanding. This encouraged students and teams to go above and beyond the stated requirements on some activities (such as doing extra homework problems). Typically, these bonuses were worth 1 coin.

Finally, coins were also awarded for semester-long accomplishments, such as maintaining perfect attendance, close to perfect attendance, and team accomplishments (such as high scores across team lab day coding challenges). These

accomplishments typically earned 3-5 coins, with (fewer) coins also awarded to runners-up.

An example of an in-class activity from early in the semester would be for the student to make their name appear at a random location on the screen. Once completed, the student would raise his/her hand to show the instructor his/her app and earn their coin(s). More complex or time-intensive activities may be awarded 2 or 3 coins.

Bonus coins were also offered to students who identified errors in any of the course content, including grammar, typos, and code syntax mistakes. One particularly conscientious and gifted student spotted so many of these that she ended the course having earned 79 coins.

The instructor was able to be as creative as he/she wished when deciding how to offer and award coins. Coins could be offered to encourage students spending time and effort on any desired activity. If the instructor felt a particular activity was difficult or especially worthwhile, more coins could be offered to encourage its completion. Activities that mainly involved "just showing up" were typically rewarded with a single coin. Although each semester was similar, they were not identical as the total number of coins earned typically varied between 50 and 60 coins, with some students earning less and some on the high end earning more.

Keeping Track of Coins

For the coin reward system to work, students needed to be able to see when coins were awarded (or spent) and to check their current balance. To allow students to do so, the instructor developed a course access app (see Figure 1, located in the Appendix). Any time students logged in to check the course app and they had received (or spent) coins, it would count them up (or down) and play a little coin-pickup (or coin-spent) sound. The coin balance is saved so that, when the student logs back in, only the change in balance (either positive or negative) is visually counted while playing the appropriate sound effect.

The course access app is a Java desktop app that loads encrypted data from a secure server. The instructor used a database to manage student data during the semester and to provide the data to the course access app. Students were required to enter a semester access code to download and install the course app and to provide an individual password to use to access the grades portion of the app (Figure 1). The app loaded the most current data each time it was launched and, optionally, checked for updated content every 15 minutes.

Spending Coins

Students were allowed to spend their coins during the semester on a few "items" and at the conclusion of the semester on several more. For example, during the semester, students were able to purchase due date extensions for homework and take-home exams. These offers were typically distributed via email and/or with a notification in the course access app. The offers included details about the price (in coins) and the deadline to purchase the item. For example, roughly 24 hours before the due date for a take-home exam, students received an email with a specific offer (see Figure 2, located in the Appendix section). In this case, the price was 8 coins to purchase an extra 48 hours to complete the exam.

Items are priced consistently from semester-to-semester based on the number of coins offered to date for the class. The pricing is influenced by the perceived value of the item to the students and typically high enough to represent a significant expenditure. For example, in the email offer described in Figure 2, the price of 8 coins may represent close to half of the number of coins offered (i.e., that could have been earned) at that point in the semester and around 15% of the final total number of coins possible to earn.

This pricing was intentional, with the goal of making students value the coins they had earned while also encouraging them to work to avoid finding themselves in a position where they needed to spend coins. Through this, students may become more highly motivated to keep up with the reading, keep current on the homework, attend office hours right-away when they need help, and to start on activities and exams immediately (leaving time for unanticipated difficulties and time constraints).

Students may also spend their coins at the end of the semester at a themed "store" (either the "Wizard's Gift Shop" or the "Pirate Pizzeria Company Store," See Figure 3, located in the Appendix). For simplicity, the store is a paper-based system because the final coins and prices are not calculated until just before the final date. However, these prices and offers in Figure 3 are not a surprise to the student. They have been

discussed in class during the semester and summarized in an email previewing the store's items at least a week in advance.

As shown in Figure 3, there are five main purchase opportunities: "erasing" an absence (which affects the student's course participation score), dropping a team lab day score (just for the purchasing student), boosting a homework check score (in case there were problems they couldn't solve), exchanging coins for doubloons to use in the store, or buying credit on the final exam (up to, potentially, 100%). Although each is priced differently, they are scaled to have nearly the same impact in terms of affecting the student's final point total (so that the coins have approximately the same value no matter how they are spent).

4. RESULTS

The system was implemented in two different undergraduate programming classes at a private university in the United States. Overall, 104 students, 72 Male, 32 Female, utilized the coin counters and completed the survey. Throughout the semester, the number of coins the students earned ranged from 24-79 coins, with the average of 43.57 coins. Students spent between 11-65 coins during the semester, with the average of 34.47 coins. By the end of the semester, most students spent as many coins as they could. Only 9.10 coins on average were left unused.

In addition, a short questionnaire about the coin counter was offered at the end of the semester, with 104 out of 122 students providing responses (85%). The survey questions and item loadings are presented in Table 1 and detailed survey results are presented in Table 2, both located in the Appendix section. As can be seen in Table 2, the results of the coin-based gamification system were positively related to the classroom outcomes. In particular, the average for each construct (for example the average of items 1 and 2 for the fun scale) on a rating scale of 1-7 was 6.25 for fun, 4.63 participation, 5.65 for strategy, 5.83 for performance, 5.79 for control, 6.09 for motivation (item 16), and 6.50 for overall (item 19). Of note, the highest rating for item was for item 19, which was an indicator of if the students thought overall the coin system was a positive addition to the class. Additionally, students perceived the system as fun, providing motivation, helping with performance and control, and although it was related to increased participation, not at the same levels of the other constructs.

An open-ended question was also used to gather general feedback about the coin reward system. The majority of students responded positively to the usage of coin counters for the classroom and assignment management and wished other classes utilized the system. Examples of student comments included "the doubloon system was very rewarding and motivated me to do better and try harder to earn additional doubloons. I think every class should have a point system of some sort like this one. It gives the students an incentive to do better and try harder in every assignment that they do," "I like the system, it also takes away the discussion of extra credit work. Smart!," "I think it creates a fun environment in the class. Increases the competition!," and "I do think the doubloon system should be implemented in other classes. It was an incentive to attend class, especially with the ability to purchase absences at the end of the semester. Many students feel it is unnecessary to weigh so much of one's grade on absences, since the harm is being done to the student for not attending rather than the professor (missing classwork, class participation, notes, etc.); hence, reflective in their grade. Therefore, as professors have controlled how effective absences are in one's grade, the doubloon system offers students to regain control of the impact."

Many students mentioned that the coin counter may help them focus more on learning and less on just finishing the work to meet the deadline. For example, "I liked having the flexibility of erasing absences and getting extra time where needed. I'm not sure how much it motivated, but it does allow me to focus on material and not worry so much about other things going on (deadlines and such)," "[The coin counter] helped students with completing assignments without penalization by purchasing extensions. Life happens and sometimes things aren't done within the timeline one sets for themselves to complete tasks," and "It definitely reduced my stress a bit knowing that I could trade in some doubloons for final grade points. Overall, a very wise, thoughtful and fun approach to a programming class."

As mentioned in some of the previous comments, the coin counters also added a fun factor to the classroom management. Additional feedback included "I loved the doubloons! It definitely made the class more enjoyable," "The [coin counter] gives students [sic] the incentives to do

more but in a fun way than just saying extra credit," and "I really enjoyed the system and loved checking to see my total."

A number of students reported increased participation and class involvement because of the coin counters. For example, "I liked the galleon system. It motivated me to participate more on optional in class activities and got me engaged," "I think the galleon system is a great system to motivate students to come to class and to do their class work. I think most students would be more interested in the class if the galleon system was provided," "I think the doubloon system was excellent. The members of my group had regular discussions on how would we spend them and we looked forward to the trophies to get extra doubloons," and "I would like to see a reward based point system more often in other classes. It gives some more incentive to come to class and to participate in activities."

When asked about what could be improved, a few students would like to know the prize options and costs of what they can purchase with their coins in order to plan their semester accordingly. Example of comments include "I liked the concept of having a sense of control in my grade. It would have been nice to have known the values and the things you could buy at the beginning of the semester," "I wish the things you could buy would be announced before than it was. It did not have to include the prices, but I would have like to know exactly what I could earn during the semester and at the end so I would know if I should save up for something better later on or spend it now," and "I would have liked to know at the beginning of the semester how much things would cost at the end, and what opportunities we would have to spend doubloons. This would have allowed me to calculate/plan for how I would like to spend them. I would have liked to be able to see how spending doubloons on various things would impact my grade. It was not easy to figure out where the best use of doubloons was to most effectively help my grade."

5. DISCUSSION

The results provided evidence that students responded well to the currency-based classroom management system. As can be seen in the quantitative survey results in Table 2, overall the students responded that positively for all items. With that being said, student perceptions of the coin-based gamification system as being fun and helping performance were the highest rated constructs, whereas participation was the lowest. The open-ended survey question also provided qualitative data on student reactions, which was again positive.

Overall, the quantitative and qualitative results provide evidence of the positive outcomes associated with the coin-based gamification classroom management system. Although we feel confident that the coin-based gamification system described in this paper was related to desired outcomes, we did not have a control group to compare against. If future classes and pedagogical research efforts would like to employ a control group, this would provide additional strength in our findings.

Although it is not something that can be seen in the results, there were a few different primary strategies that students employed with their collecting and spending their coins. In terms of collecting coins, some students (e.g., those who were higher in achievement-orientation) wanted to collect every point possible as it served as motivation for them. Other students were motivated to collect some coins, but did not capitalize on every coin collecting opportunity as they were content to have a decent number of coins. As for spending coins, some students get behind on their homework and have to use most (if not all of their coins) for due date extensions. Other students stay current on all of their work and save all of their coins (hoarding them). These students then end up using most of their coins on the final exam for a due date extension, extra points, or even buying it off completely if they have enough coins. As noted above, it would likely help all students, especially the hoarders, if they knew early in the semester what they could spend their coins on at the end of the semester. This is an enhancement that we recommend for future instructors using this type of classroom management system.

Students also saw the system as a fair way to receive (purchase) help where they specifically needed it. The coin system created an in-class economy of sorts, in which coins were a fungible resource to be spent as each student wished. For example, in some classes the professor will offer to drop the lowest quiz score. This is a generous policy, however, it doesn't benefit students who do great on all of the quizzes. Some of these students may benefit instead from extra time on a project, having an absence erased, or dropping the low score on a team activity. The system of

virtual coinage allows students to make these decisions as individual, rational actors.

Another set of findings relates to the impact of this coin-based gamification system on the instructor. In terms of positives, the instructor that students enjoyed the gamification system and performed better in the class. Additionally, there was less complaining and haggling when compared to a traditional classroom management system. With the coin-based gamification classroom management system, students knew how to earn the currency and how it could be spent (e.g., on due date extensions). As a result, there were fewer specious requests and arguments about due date extensions, extra credit, 'excused' absences, and such, which are otherwise so common.

Although there were advantages for the instructor, we must also acknowledge some of the downsides of this system. First, in terms of developing and setting up the system, there was a considerable investment of time. There was significant amount of programming involved, which we acknowledge that many instructors would be unable to perform themselves. For those that can do the programming, time is required to set up the system, forms, write up documents, and more. After the system is set up, there is a time commitment exerted with managing the system. Emails, such as the one shown in this paper, are sent to students and then students respond with personalized emails. Based on these personalized emails, there are likely to be different due dates for different students. Again, while this appears to clearly benefit students, it requires the instructor to manage more complex information, which would be more difficult as class-sizes increase.

For instructors looking at using such a system, it is important to realize that there are definite pros and cons. Students responded positively to the system, but there were enhancements that could be made on the instructor's end. One enhancement that was also mentioned in the open-ended comments relates to better information about what coins can be spent on at the beginning of the semester. This will better enable students to develop a strategy about how to optimally spend their coins throughout the semester. Hopefully future research will examine the impact of a similar type gamification system with more full information available for students at the beginning of the semester. Another suggestion for instructors is to take a long-term perspective with using this gamification classroom management system. There is a high initial time investment to setting up this system, but there is less time involved in future semesters using the same system. Also, if an instructor was able to automate the process of using the coins (i.e., clicking an online button as opposed to emailing the instructor) that would save the instructor considerable time. Finally, there could be sharing of resources between instructors to get the system up and running. As there is not always the need to "reinvent the wheel", there could be a considerable benefit to utilizing and even enhancing another instructor's existing system.

6. CONCLUSION

With student expectations changing and the increased popularity of gamification in a number of different aspects of life, this paper described a coin-based gamification classroom management system. The high level goals for this system were improved student engagement, enjoyment, and better management classroom expectations. The results showed that there were a number of benefits for students and they responded positively about the system. In particular, students thought the gamification classroom management system was fun, helped their classroom performance, increased perceptions of control, and helped with class strategy. There were also good points of the system for instructors, but there were some negatives that must be acknowledged, primarily related to the amount of time spent on the system. This paper provides suggestions for future pedagogical research on this topic, ideas for enhancing the system described in this paper, and recommendations for future researchers who might be considering using a coin-based gamification classroom management system.

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APPENDIX

Figure 1 Student individual interface showing overall performance and Galleon balance (Highlighted in red)

To: Student
From: Instructor
Date: Today, 8:30 PM
Subject: A Special Offer

Even though it is a virtual currency, the urge to spend your galleons can be ferocious. What should you buy with it? They say the only valuable commodity in life is time. When at work we trade our time for money, an exchange that often only makes the IRS happy. In any case, if you are struggling on your Exam 1 (due by class time tomorrow), I have an offer for you: For a measly 8 Galleons you may stretch the due date an entire 48 hours (to Thursday before class) without any late penalty.

This offer expires at 8AM tomorrow. Email me before 8AM if you want buy time by purchasing the Exam 1 deadline extender.

Figure 2 Example of offer notification

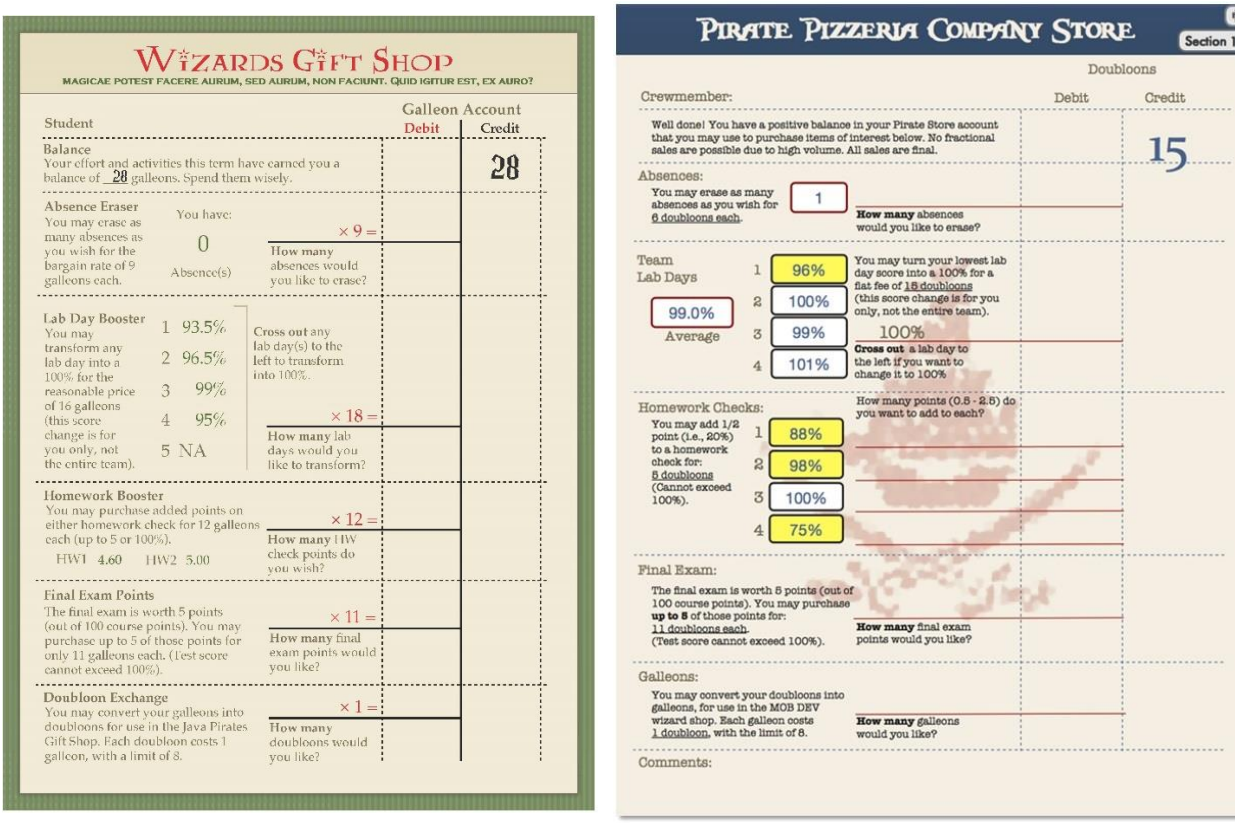

Figure 3 Themed Stores

Factor/Items	Cronbach's/ Item Loading
COMPUTER PROGRAMMING POSITIVITY	**α = 0.792**
I find the idea of developing apps: Boring (1) – Exciting (7)	0.079
Working with computers is: Frustrating (1) – Enjoyable (7)	0.043
FUN	**α = 0.660**
1. I enjoyed earning coins	0.554
2. It was fun to check the course app and see how many coins I had earned	0.792
PARTICIPATION	**α = 0.718**
3. I attended more classes than I otherwise would have in order to earn more coins	0.718
4. I would have skipped a relevant extra-curricular activity if coins had not been offered as a reward	0.537
5. The galleon system encouraged me to participate more fully in this class than I otherwise would have	0.631
STRATEGY	**α = 0.711**
6. I thought it was important to earn all of the coins I could	0.684
7. I had a clear strategy in terms of how I planned to use my coins this semester	0.595
8. I managed my coins well this semester	0.652
9. I gave this class 100% of the time and effort I needed to be successful	0.644
PERFORMANCE	**α = 0.762**
10. I expect to earn a higher grade in this class due to my use of coins	0.000
11. Being able to use my coins to purchase items I needed boosted my performance in this class	0.459
CONTROL	**α = 0.459**
12. The coin system gave me a sense of control over my course grade	0.280
13. The coin system was a fair way to receive credit where I most needed it	0.525
14. Coins were distributed in an equitable manner to all students in this class	0.319
15. The coin system allowed me to be more flexible with my time and effort in this class	0.419
Others	
16. I was motivated to do well in this class 17. I planned to use my coins as needed during the semester 18. I planned to save my coins until the end of the semester 19. Overall, the coin system is a positive addition to this class	N/A

Table 1 Survey questions and item loadings

			Survey responses (1=Strongly Disagree; 7=Strongly Agree)												
Item	**Mean**	**SD**	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**
1 Fun	6.36	0.82	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.8%	0.0%	9.6%	1.0%	31.7%	0.0%	53.8%
2 Fun	6.14	1.06	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	6.7%	0.0%	10.6%	0.0%	34.6%	1.0%	45.2%
3 Participation	4.44	1.98	4.8%	0.0%	20.2%	0.0%	10.6%	1.0%	14.4%	0.0%	8.7%	1.9%	16.3%	1.0%	21.2%
4 Participation	4.32	1.76	5.8%	0.0%	15.4%	0.0%	7.7%	0.0%	24.0%	1.9%	17.3%	0.0%	14.4%	0.0%	13.5%
5 Participation	5.13	1.57	3.8%	0.0%	5.8%	0.0%	4.8%	0.0%	11.5%	1.0%	22.1%	1.9%	30.8%	1.0%	17.3%
6 Strategy	6.02	1.08	0.0%	0.0%	1.0%	0.0%	2.9%	0.0%	3.8%	0.0%	18.3%	0.0%	33.7%	0.0%	40.4%
7 Strategy	5.18	1.74	1.9%	1.0%	9.6%	0.0%	7.7%	0.0%	6.7%	1.0%	20.2%	0.0%	23.1%	1.0%	27.9%
8 Strategy	5.71	1.33	1.0%	0.0%	2.9%	0.0%	3.8%	0.0%	6.7%	0.0%	18.3%	1.9%	33.7%	0.0%	31.7%
9 Strategy	5.68	1.37	1.0%	0.0%	4.8%	0.0%	4.8%	0.0%	1.9%	0.0%	17.3%	0.0%	42.3%	1.0%	26.9%
10 Performance	5.96	1.17	1.0%	0.0%	1.0%	0.0%	1.9%	0.0%	4.8%	0.0%	19.2%	0.0%	32.7%	0.0%	39.4%
11 Performance	5.69	1.24	1.0%	0.0%	1.9%	0.0%	2.9%	0.0%	7.7%	1.0%	20.2%	1.0%	36.5%	0.0%	27.9%
12 Control	5.69	1.10	0.0%	0.0%	1.0%	0.0%	3.8%	0.0%	7.7%	1.9%	20.2%	1.0%	40.4%	1.0%	23.1%
13 Control	6.30	1.09	2.0%	0.0%	0.0%	0.0%	2.0%	0.0%	1.0%	0.0%	4.9%	0.0%	36.3%	2.0%	52.0%
14 Control	5.79	1.21	1.0%	0.0%	0.0%	0.0%	5.8%	1.0%	4.8%	1.0%	15.4%	0.0%	41.3%	0.0%	29.8%
15 Control	5.36	1.32	1.9%	0.0%	2.9%	0.0%	2.9%	0.0%	14.4%	1.9%	17.3%	0.0%	43.3%	1.0%	14.4%
16 Other	6.09	0.96	0.0%	0.0%	0.0%	0.0%	2.9%	0.0%	3.8%	0.0%	12.5%	0.0%	42.3%	1.0%	37.5%
17 Other	4.85	1.84	3.8%	0.0%	15.4%	1.0%	2.9%	0.0%	14.4%	1.0%	10.6%	1.0%	30.8%	1.0%	18.3%
18 Other	5.94	1.27	1.0%	0.0%	1.9%	0.0%	2.9%	0.0%	3.8%	1.0%	19.2%	0.0%	26.0%	1.9%	42.3%
19 Other	6.50	0.71	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	6.7%	1.0%	28.8%	1.0%	60.6%

Table 2 Student responses to survey questions

Navigating the Minefield of Self-Publishing E-Textbooks

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Abstract

This paper examines the issues useful for faculty members that are considering electronically self-publishing their course textbook. A brief history of the use of electronic textbooks is presented as well as the advantages and disadvantages associated with self-publishing and electronic textbooks. A brief overview is provided on the process of electronic publishing and the resources available. Ultimately, faculty members undertaking the task of self-publishing an e-textbook need to ensure that the product is of high quality and useful to their students.

Keywords: self-publishing, electronic textbooks, e-textbooks, Kindle, textbook pricing

1. INTRODUCTION

Technology has been disruptive to many media industries over the past decades. The music industry saw the decline of physical sales and struggled to adjust business models that no longer met the needs of consumers. Newspaper circulation declined, DVD sales declined and cable television lost subscribers to streaming services.

Meanwhile, the book industry rolled with the changes. Electronic books or e-books, and portable e-book readers became common and the self-publishing industry exploded, changing the way the big five publishing houses conducted business. Despite the changes, the technology has been somewhat less disruptive in the publishing industry. Even though revenues of e-books have grown since the introduction of devices such as Amazon's Kindle, the e-book has held steady at 20% of the market share over the past few years, with an even smaller portion in academia (Inyoue, 2016). These overall statistics about publishing in general are sensitive to trends and sales of e-books may have stagnated over the past year due to trends such as adult coloring books and areas of publishing such as children's books that have seen little encroachment from the e-book (Milliot, 2016a). Results of a Codex survey of readers indicate that even though e-book readers are prevalent and available in many platforms, they are not necessary devices like their digital music counterparts. Readers in the same survey indicated that the development of e-reader usability has also slowed the disruption of technology in publishing (Milliot, 2016b).

These problems as well as others that may be specific to the textbook industry have also slowed the development of the e-textbook. However, recent discussions of various aspects of higher education from soaring costs to changes in teaching strategies may be reasons for faculty to consider adopting e-textbooks or authoring their own. This paper will discuss the brief history of the e-textbook, list the pros and cons of self-publishing an e-textbook, and finally give an overview of the process in self-publishing a textbook.

Short History of the Electronic Textbook

The electronic textbook or e-textbook has a relatively short history tied mostly to the technology that supports them. An e-book has been defined as "any piece of electronic text regardless of size or composition (a digital

object), but excluding journal publications, made available electronically (or optically) for any device (handheld or desk-bound) that includes a screen" (Armstrong, Edwards, & Lonsdale, 2002). There are examples of textbooks distributed or supplemented with content on CD's starting in the early 1990s but the transformation in the industry began with the introduction of e-reader software from major distributors such as Amazon's Kindle and Apple's e-reader (Chesser, 2011). These early applications were aimed at page replication, showing reproductions of printed pages, but have quickly evolved to include full-color images and multimedia content. With the potential for growth in the e-textbook market, many traditional textbook publishing companies have reimagined themselves into media-rich learning distributors through acquisitions of technology companies such as Pearson's purchase of e-College (Bossaller & Kammer, 2014). Many of the major textbook companies not only offer digital versions of their products but also have moved to development of highly interactive, immersive textbooks and supplemental resources. With skyrocketing prices of traditionally published textbooks, some faculty are looking at alternatives in self-publishing that can produce textbooks that are high-quality, inexpensive, and royalty producing (Fox & Patterson, 2015).

Cost of Textbooks and Higher Education

Development of these interactive, digital textbooks can also mean higher prices to cover the costs associated with the new content. Over the past three decades, the cost of higher education and textbooks in particular has consistently outpaced inflation at a rate of 300% (Economist, 2014). There has been public outcry and even legislative attempts to regulate pricing in publishing to help lower the costs associated with higher education attendance. Various studies and surveys have uncovered startling facts in textbook usage. Overall, less than 60% of students buy the current edition of assigned textbooks. Around 25% of first year students and more than 30% of senior level students do not buy the textbook at all (Cannon & Brickman,2015). As a result of price increases, other options have appeared that many students now utilize to control their textbook costs

The tried and true used book market has been expanded through the use of the World Wide Web. Students can not only find competitive pricing but also cheaper international or older editions of textbooks when available. This may cause problems as case studies, examples, homework problems and other content in the books may be different than the edition selected by the faculty member teaching the course.

A more recent option for students is the rental system where students pay a smaller fee to use the book for one semester. Students who rent books are not allowed to mark or notate their books. Since rented textbooks are returned at the end of the semester, students are unable to use them in subsequent semesters as a reference for higher level classes. Sometimes, depending on the rental contract and the academic calendar at an institution, students may even have to return their textbook before the semester is complete.

Unfortunately, many students struggling with the financial burden of higher education may also choose not to purchase their textbook at all. While these options can lessen the cost of attendance for students, the fact remains that they are still likely to continue to rise significantly. Used book prices are tied to the price of new textbooks and the rental prices on textbooks are set according to the list price of the book. If textbook prices continue to increase, so will these less expensive options.

Of course, one of the additional ways students save money is to purchase the electronic version of their textbook. Currently, the average price of an electronic textbook is half of its print counterpart (Young, 2009). While the e-textbooks are still considered too expensive for some students, many will take advantage of this option because a discount is provided by the publisher since production costs are lower. Many times this discount may not be as significant because the majority of cost in textbook publishing is related to intellectual property and production costs such as editing and page layout.

2. WHY CONSIDER SELF-PUBLISHING AN E-TEXTBOOK?

There are many reasons to consider self-publishing an e-textbook that range from cost savings for students to increasing supplemental income. The textbook writing process is not an easy one but there are many benefits to be gained from the process.

First, in response to the previous discussion about cost of textbooks, self-published authors have the ability to set their own price point on their textbook and can even give discounted copies or free copies to students. This allows the author to provide significant cost savings to their own students but still retain royalties from other people purchasing their product. Since the price

point can be set significantly lower than a traditional print textbook, some authors may consider writing their content to reach a wider audience that normally would not consider purchasing a very expensive college textbook. Introductory programming textbooks or HTML/web programming textbooks might have a broader appeal than highly specialized or technical topics. Faculty can set their prices similar to that of other technical e-books and may find customers beyond the classroom.

Depending on the platform used to publish the text, authors can keep up to 70% of their sales. With additional marketing of the text to other faculty members or a general audience, authors can create a side income stream while reaping the additional benefits of self-publishing their instructional material.

Control over content and the ability to quickly update the textbook to keep pace with changes in information systems fields may be a benefit for some faculty members to consider. A traditional print textbook takes a significant amount of time to complete the publication process, with updates and new material having to wait until a new edition is released. With e-publishing, faculty members have the ability to update content frequently. With some platforms, these updates can be pushed out to everyone who has purchased the book. For example, a web design faculty member may decide to update a section on Cascading Stylesheets as new standards are implemented and anyone who has previously purchased the item can elect to receive these updates for free. In addition to the ability to keep content up to date, faculty members can also organize and include information that mimics the way they choose to teach their course. Self-published authors have complete control over topic inclusion and organization.

Because today's students tend to be technologically savvy, familiarity and acceptance of an e-Textbook is not the hurdle it once was. There are some concerns with usability that will be addressed in a later section, but the prevalence of various free e-book readers and distribution platforms make the publication process easy and ubiquitous. E-readers are available for Macintosh, Windows, Android, and MacOS. Textbooks can be readily available to students on their phones, their tablets, and their laptops. The mobility of the textbook potentially could increase student use of textbook as they have the ability to use the electronic version while waiting for classes to begin, taking breaks at work, or traveling home on breaks or weekends. Include the ability to create immersive, linked resources and the platform may appeal to millennial students more than a traditional textbook.

Finally, as many universities looks for ways to be better members of their communities, some are investigating ways to become more sustainable and eco-friendly. The electronic version of the textbook eliminates the printing and ultimate disposal of textbooks once they become out of date. Particularly in information systems where content quickly changes, older editions are not only discarded frequently but older editions, unlike other fields such as literature or history, have little value once they become obsolete. They quickly find their way to landfills or in best case scenarios, the recycle bins where possible.

3. THE PITFALLS OF SELF-PUBLISHING AN E-TEXTBOOK

First and foremost, the one major obstacle in self-publishing an e-textbook is the amount of work involved. Writing a college level textbook is time consuming and is a major undertaking that can be difficult to balance with teaching, research, and service requirements of a faculty member. Creating content, editing, page layout, cover design, and marketing are all services that are provided to the author by a traditional publisher. Once the writing is complete, there is the question of quality control which is many times handled by various editors at a publishing house. The acquisitions editor will determine the need or market for an item. The copy editor will pour over every word and comma to ensure a professional and well organized manuscript. Reviewers and potentially developmental editors will discuss appropriate topic coverage, quality of content, and fact checking. Finally, the production editor will prepare the completed manuscript for the publication process (Hewitt & Regoli, 2010). As a self-published author, all of these tasks will either need to be completed by the author or outsourced, sometimes at great expense, to others who have expertise in these fields. This potentially is one of the more daunting aspects of self-publishing. Faculty members are considered experts in their field of information systems but may have little to no experience in cover design, page layout, or copyediting. Ignoring these tasks could result in a manuscript with quality issues that ultimately will not serve the student well.

Another consideration in the decision to self-publish a textbook is the lack of supporting material for teaching. Many of the textbooks distributed by major publishers today include a plethora of supplemental material ranging from test banks to online course shells. In addition to the supplemental resources provided to instructors, publishers also provide many supplemental learning resources to students when they purchase their textbook. When making the decision to self-publish, faculty must consider their use of these supplemental resources. If they feel they are important, more time can be dedicated to including these resources in the electronic textbook but must realize that this will require even more time and could potentially require more expertise in different platforms and e-readers. In addition to time, multimedia resources can be very expensive to produce and many faculty members will not have the resources or expertise to create additional materials.

Accessibility and the use of e-readers has garnered research over the past few years as e-books have become more prevalent. In academia, many studies have looked at how students use electronic textbooks, their preferences, and performance compared with reading traditional print textbooks. Studies have found that retention and performance on quizzes and exams is similar using both formats but found that reading the electronic version many times took much longer to complete or that students spent less time using the textbook (Shepperd, Grace, & Koch, 2008; Woody, Daniel & Baker, 2010). Student preference has mixed results with some studies indicating that students do not prefer an electronic version of a textbook because they find the digital version harder to use (Thayer, Lee, Hwang, Sales, Sen, & Dalal, 2011; Falc, 2013) This in turn may result in students buying or renting the print version even if the price is higher. Other studies indicate that students prefer some of the functionality of an e-textbook over the print counterpart and would purchase the lower priced e-textbook (Lyman, 2008). Ultimately, the acceptance of an e-textbook can depend on many factors ranging from intention, perceived ease of use, usefulness in the class, and attitude (Hsiao, Tang, & Lin, 2015; Chulkov & VanAlstine, 2013).
Accessibility for students of varying abilities also must be taken into consideration. In 2010, universities settled with vision impaired students who were unable to effectively use Kindle e-books circulated by the library (Blumenstein, 2010). On the other hand, e-readers can be customized to select font characteristics such as size that is obviously unavailable in print textbooks. Many options and improvements have been made to devices and software such as speech to text translators, but faculty must always remain aware of special needs of students and their access to textbooks.

Intellectual property rights and institutional policies regarding textbook selection should also be examined before deciding to self-publish an e-textbook. Depending on the platform selected, many times the content of an e-textbook will be protected by the software being used to create the e-textbook. Publishing in more open formats such as PDF or Word document format potentially cause problems of unlawful reproduction and distribution of the e-textbook. Depending on the author's goals in publishing, this could potentially require time and effort in order to protect intellectual property. In addition to protecting one's own intellectual property, authors should be well versed in the use of copyrighted work in their own e-textbook. Since the publication of an e-textbook could potentially generate profit and would not be considered spontaneous use, many of the protections of fair use that faculty rely on in the classroom would not apply to the production of an e-textbook.

Additional concerns about institutional policy may also affect the decision to self-publish an e-textbook. Some universities share in royalties off intellectual property which can become a little more complicated in an electronic environment depending on the agreement between the administration and the faculty member. In addition to royalties, some institutions have strict guidelines on faculty requiring students to buy their own textbook in order to avoid a conflict of interest.

4. HOW TO PUBLISH AN E-TEXTBOOK

There are many things to consider and plan when electronically publishing your own textbook. Beyond creation of the content, authors must choose a distribution platform and perform tasks to ensure the quality of the e-textbook. Planning for these tasks before writing begins can make the self-publishing process much more efficient.

Choosing a Platform

Factors to consider when choosing a platform for your e-textbook include availability, formatting options, pricing, royalty structures, and ease of use.

When it comes to availability, the major players in the self-publishing world are Amazon's Kindle and Apple's iBooks. Both reach wide audiences but Kindle reaches a larger audience with its reader app that is available for Apple, PC, and Android platforms. Successful self-publishing e-textbook authors Fox and Patterson (2015) found that when publishing their first edition of their Engineering Software textbook, 99% of the sales went through Amazon.

Publishing only on the iBooks website can limit access to many students who might not have iPhones or iPads. Other e-readers and distribution sites such as Kobo have apps for all platforms but have not achieved the popularity and market share of the Kindle e-book reader. Another option is to utilize the services of an e-book distributor that formats and sells books to all of the major e-book retailers. Companies such as Smashwords allow authors to provide their books in multiple electronic formats that hit most of the e-readers including smaller markets such as the Nook.

Once a platform has been chosen a platform to distribute the e-textbook, authors should become very familiar with the formatting requirements and any helper software that is provided by the distributor. All of the distributors will have help sites and many will have separate e-books to help navigate the publishing process. Kindle Direct Publishing has tools that easily convert PDF documents into the Kindle format but there are strict formatting requirements that need to be followed for successful conversion. Knowing these formatting requirements before starting to write can save significant time when moving content to the publishing platform.

Amazon also has a tool available to faculty specifically for publication of e-textbooks. The Kindle Textbook Creator creates the Kindle file and assists authors in adding interactive content in the form of audio, video, and images. If the e-textbook will consist mostly of text, the regular Kindle publishing process will suffice. However, if authors want to add multimedia content to their e-textbooks, the Textbook Creator would be a better option. Authors should be aware that content created using the Textbook Creator is unlikely to work on text only readers, found mainly on Kindle's dedicated e-reading devices such as the Kindle Paperwhite. Tablets, phones, and computers that have the Kindle app installed will be able to view content created with the Textbook Creator.

One additional benefit to consider in the Amazon suite of publishing tools is the ability to distribute print copies to students who wish to purchase a traditional textbook over an e-book. Amazon Create Space allows authors to list both versions on the Amazon website. Amazon provides free tools to help design the print version of your book, sets different royalty levels, and allows for international distribution. The ability to create print versions can also allay some of the accessibility fears that might exist surrounding readers, although that could just as easily be resolved by providing the PDF or Word version of the manuscript directly to students with special needs. The ability to distribute a book in print is not available on most other platforms for digital self-publishing.

Other general things to explore when choosing a platform would be pricing requirements, royalty amounts and distribution processes, editing and updating restrictions, and exclusivity requirements. All of the publishing platforms should explicitly address all of the economic and intellectual property control when submitting manuscripts and presentation of user agreements. As mentioned before, larger platforms such as Kindle Direct Publishing have user manuals and extensive help sections to assist authors in publishing their work.

Quality of the Electronic Textbook

Assuming a platform has been chosen and the textbook has been written, the next step in the publishing process is to prepare the manuscript for publication and ensure the quality of the product. The two main areas of concern for quality are the presentation of the information and appropriate scope of information. One of the most frequent complaints about self-publishing e-textbooks is the lack of critical review (Hewitt & Regoli, 2010). As discussed earlier in traditional publishing, a team of editors perform many tasks to increase the quality and value of textbooks. With self-publishing, authors need to undertake some of these tasks on their own or acquire these services through outsourcing or collaborative work with colleagues. Before publishing, authors should consider having colleagues review the textbook to make sure that the textbook accomplishes its pedagogical goals. Reviewers can make recommendations about including or excluding coverage of certain topics or areas that are relevant to the subject matter. They can

ascertain that the information presented is factual and correct. Reviewers can help identify errors with examples or programming code that might have been overlooked by the author. Finally, reviewers with expertise in the subject area can give feedback on organization and presentation of information.

In addition to the services of experts in the field covered by the e-textbook, authors may also wish to enlist or outsource technical publishing tasks such as copyediting, page layout, and graphic design. Ultimately, this decision will come down to the author's skills in these areas, the amount of time and effort, and any available funds to put toward these tasks. Many of the platforms such as Kindle Direct Publishing provide tools that help with basic layout and some graphic design for book covers and may suffice for very straightforward, text laden manuscripts. Amazon also has a marketplace to allow authors to purchase the services of some of these publishing experts. Freelance editors and graphic designers can also be located through various freelancing websites such as Elance.com or Upwork.com.

Although not directly related to e-textbooks, faculty should also understand how and why students actually use their textbooks and try to accommodate these concepts into their self-published e-textbooks. In a comprehensive study on textbook use and performance, Landrum, Gurung, & Spann (2012) found that students like textbooks that are practical to their lives, that it is accessible and readable, and includes graphs and tables. The same students indicate that they are more likely to use the textbook when it contains study aids and reviews and when the book is easy to use.

5. CONCLUSIONS

When investigating the possibility of self-publishing, faculty must decide if the immense amount of effort and time needed to produce an e-textbook is worth it. Faculty members interested in creating e-textbooks may not have the time or the resources available to write a textbook from scratch. Instead, they may want to work with librarians to compile journals articles or existing electronic resources available to students to create a custom text for a class. Universities interested in reducing costs and improving sustainability have created programs that incentivize faculty into exploring these options and assign a librarian to each faculty member participating in the program to assist in creating custom material (Free, 2016). Other options include using open textbooks that are growing in popularity.

For the faculty member that wants to control and shape the content presented and the order it is presented, self-publishing an e-textbook may be the ideal solution. The platforms available for publishing are easy to use and in many cases free. Faculty can choose to provide low cost textbooks or can market their textbook beyond their classroom and collect royalties to supplement their income.

However, faculty members should realize that these royalties are limited and may be consumed by outsourcing production services such as copyediting and design. Depending on the topic, large audiences might not be available for very specialized topics and more general topics may get lost in the vast amount of self-published material. For example, an e-textbook on HTML published on Amazon must compete with 21,196 other HTML books that are available through traditional publishing houses and self-published e-books on the subject. Unless the faculty member wants to spend additional time marketing their e-textbook, royalties will play a smaller role in the self-publishing decision process.

Ultimately, the faculty member should keep the success of their students in mind. The pros and cons of an e-textbook when it comes to student preference should be taken into consideration. While the cost of textbooks is an obvious concern, a poorly designed or poorly written textbook will not be used regardless of cost. Faculty members who choose to self-publish e-textbooks should ensure that the product they are requiring their students to purchase is well-written, easily accessible and widely available. Faculty should enlist the help of colleagues or editing professionals to review the scope of the material and provide sufficient coverage of the subject material to increase student's understanding and skills. Finally, faculty members should continually strive to improve their textbook to meet the needs of their students by monitoring student use and gathering insight into how the e-textbook is being used. Questioning students about their satisfaction with the text overall and its ease of use can provide insight for the faculty member on ways to improve their textbook even more.

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Emergence of Data Analytics in the Information Systems Curriculum

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Abstract

As a phenomenon of interest, impact, and import, there is little doubt that the pervasive expansion of data is upon us as Information Systems educators. Concerns and topics such as Data Science, Data Analytics, Machine Learning, Business Analytics, and Business Intelligence are now ubiquitous and often situated as being the "next big thing." Educators and practitioners who identify and resonate with information systems, as a discipline, are watching these developments with interest. With data being both input and output to so many concerns that intersect with the information systems discipline, several themes emerge when considering what curriculum and pedagogy are appropriate. The role, position, location, and shape of data science topics are considered. Curricular approaches are also discussed with an eye to breadth and depth. Fundamental and existential questions are raised concerning the nature of data science and what role the Information Systems discipline can play. We also discuss evidence from cases. Case one involves a student business analytics competition and case two investigates how information systems knowledge areas can appropriate data science as an integral component of many competencies that exist solidly within the canon of Information Systems (IS) topics.

Keywords: IS Curriculum, Data Science, Data Analytics, Machine Learning, Business Analytics.

1. INTRODUCTION

In the late 1990's, the data mining discipline was viewed then as a "single phase in a larger life cycle" of Knowledge Discovery in Databases (Collier et. al., 1998). The earliest we could trace back the offering of datamining courses is to Guo (1998) and Lopez (2001). Since then, data mining has evolved from appearing as elective course in an Information Systems (IS) Curriculum (Lenox 2002, Patel 2003, Goharian 2004, Musicant 2006, Jafar 2008, Asamoah 2015) to a minor area of study, a co/dual-major, or even as a fully-independent degree program. Today, this degree program will typically be referred to as Data Analytics, Business Intelligence or Business Analytics. Although the content of the curriculum (or even the individual courses) is emergent, and therefore as stream-lined as in the case with the more mature disciplines of finance, accounting,

marketing, we do see the need for an extended minor, a co/dual-major and/or a undergraduate program in data analytics in the IS curriculum. In this paper we extend our consideration of the data analytics subject by articulating the case and the requirements for a Master's degree in data analytics as an IS degree program.

In the past 10 years, terms and concepts popularly known as Big Data, Data Science, Data Analytics, Machine Learning, Business Analytics and Business Intelligence have become lexically normalized in the discussion of unfolding horizons that impact organizations, their use of information technology, and their expected utility of their information systems. In both the academic and corporate worlds, these terms are somewhat elusive as they mean different things to different constituencies (O'Neil 2014).

We use the terms machine learning, and data science to highlight the Statistics-Mathematic-algorithmic and the Computer Science aspect of the discipline where the theory is established and the algorithms are coded. We use the terms Data Analytics, Business Analytics or Business Intelligence to emphasize the applications side of the discipline where algorithms are understood, the underlying computing software is comprehended and utilized to solve business problems, reveal patterns and extract insights from the data. We use the term Big Data to emphasize the volume, variety, velocity and veracity of data and the need for fault-tolerant computing platforms that can manage large amounts of unstructured data where daily tasks need to be parallelized, distributed, load-balanced, processed and results are combined. It is the layer of abstractions created to hide the infrastructure code and manage these tasks. It is the Map-Reduce model and its derivatives. This paper focuses on curricular issues as they relate to data (business) analytics. We will use Data Analytics to mean both Data Analytics and Business Analytics.

Simon (2013) describes data analytics as "…the combination of statistics, mathematics, programming, problem solving, capturing data in ingenious ways the ability to look at things differently and the activity of cleansing, preparing and aligning data." Conway (2010) summarized it as the intersection of hacking skills, mathematics & statistics combined substantive expertise. Conway's (2010) Venn diagram elegantly and colorfully draws the boundaries between machine learning, traditional research, data science and the danger zones. Figure 1 is a testimony to the many intersections of the data analytics disciplines. For example, a self-driving car or a pattern recognition system are examples of machine learning; however an recommender system or a system (such as what drives the consumer experience when shopping on Amazon's website) that is used to reveal patterns constitutes data analytics. Figure 3 is an illustrative attempt to disambiguate the problem space.

The sum of these innovations in data management and use are both prescient and compelling in a contemporary dialog on the themes and content that define the IS discipline. As an inter-discipline, IS has commonly absorbed innovations over its history. Thus, it is quite normal for IS to develop an existential conversation when new waves of innovation impact its shores. However, as a bridging discipline, between organizations, people, information and computing technology, data is foundational the discipline's identity in an acute sense.

Normalizing the Discipline

Data is in the very bloodstream of an organization. Every aspect of business, government, science, humanities, medicine, etc. has both a data and an analytics component. Further having emerged out of the various schools of business concerns, IS has always had a central focus on data and its processing. Rhetorically, we can ponder "what do transaction processing and analytical processing have in common and where do they bifurcate?" Arguably, their intersection and union revolves around data. Transaction processing uses business models (rules) to manipulate the data. Simply put. it is SQL-based data warehousing analytics. Analytical processing on the other hand, relies on wider ranges of data including transaction processing and digital sensors (social media, web, apps, government, etc.). Analytical processing uses statistical models to sift through and extend the use of transactional data to produce insights and reveal patterns. We may even argue that analytical processing would not have existed if it was not for the maturity and openness of transaction processing systems.

Rush to Discipline

All of the business disciplines are exuberant over the prospects of data analytics. Further, this exuberance is leading to a rapid refashioning towards data analytics, up to and including the development of new programs. We could see a situation where no two Data Analytics degrees are the same as the tenets of the discipline are not

focused, defined, or agreed upon. In many cases, this problem persists with IS discipline at large.

This leads to questions regarding who "owns" the data analytics topic. In academia, we can posit that one common point of contention in academic institutions these days is the issue of ownership and where should the different courses be housed. We can even ask where interdisciplinary programs such as text analytics and social media analytics should be housed. In the Kuhnian (2012) sense: the ebb and flow, and evolution and emergence of disciplines is per paradigmatic shifts. Disciplines flourish or flounder according to need and environment, but also fad and fashion. Thus the ownership question remains. Whether computer science calls it machine learning or data science, or mathematics-statistics call it data science or data analytics, or IS programs call it data analytics or business analytics, we acknowledge the fact that although the different disciplines have the same concerns, they have different focuses.

Fundamentals

We now examine the nature of the concerns, trends, emerging disciplines, and other phenomena surrounding the rush to data. We consider data analytics in terms of its first principles, and contrast and compare these first principles to those of IS.

Let us reflect on the circular relationship between transaction processing systems and analytic systems. To build transaction processing applications, data, business logic, reporting and presentation are core concerns. To build analytical processing applications, data, algorithms, model validation, discovery, insights and presentation are core concerns. Further, we can characterize transaction and business processing algorithms as a transparent and open box, whereas analytic processing can be seen as a translucent black box. In both cases, core concerns remain data design, gathering, repurposing, conceptualizing, storing, retrieval, manipulation and presentation. Some common present day use cases come to mind which belie the complexity and systems knowledge required to function effectively. Take the case of an association Rules (Recommender) System:

- Using R (programming language and software environment for statistical computing and graphics) and its packages, prepare the data so it is a transaction.
- Clean up the data to establish non-duplicate items in a basket. Try to interpret the results.
- Grapple with incompatibilities between package versions and R-Versions as the project evolves.
- Often, the data is poorly organized and error-prone as given/found/extracted. Null values, type mismatches, and other data quality issues may take hours or even days to correct.
- Data consolidation and exploratory data analysis is challenging and may require a variety of tools (R, Python, SQL, Excel, Excel pivot tables and tableau).
- Multi-tasking and high task saturation commonly accompanies the above steps in an iterative nature where jumps among the steps are common.
- We may also think that (which is most likely the case) that a transaction processing system provided input data to the recommender system.

Thus, actionable results are not simply a matter of firing up a data analytics computing engine, connect to data, and display tidy results on a dashboard. Rather, it is a matter of integration. Classic problems related to software engineering and IS development are readily evident. Basically a data analytics project is just another software engineering project where different people with different skills work together to produce a software product.

This narrative gives way to the central theses of this paper:

- What is data analytics?
- What does data analytics hold for IS, and vice versa?
- What makes data analytics different? (we already transitioned through the knowledge-engineering era and phasing-out the data warehousing era)
- How have colleges and universities met the growing demand for data analytics skills?
- What is a good IS approach to incorporate data analytics into the curriculum?
- What have we learned from early experiences?

These questions come full circle to our context of IS education as we must decide how, and to what extent, will data analytics pervade the discipline. There are even questions related to the appropriate level for engaging data analytics. Should data analytics gravitate more towards a graduate-level concern? At the graduate level, given the demographics of the students, we may focus on skill building and expanding the boundaries of their technical skill knowledge, contrasted with their foundations in a given subject matter area of expertise (medical, financial, marketing, education, learning, etc.). At the undergraduate level, the needs of foundational systems development topics may "crowd out" the data analytics topics such that

the subject may not be feasibly or fully explored. Concomitantly, there is also a requisite level of intuition, driven by tacit knowing and acumen in subject matter expertise wrought through long-term exposure to data, necessary for success. This is evident from the diversity of the degree programs in the area.

2. ARTICULATING A DATA ANALYTICS CURRICULUM FOR IS

As there are heterogeneous inputs to and consumers of data analytics, it is natural for many disciplines to become involved with data analytics and otherwise appropriate its benefits to suit their ongoing core dialog. As such, given the nascence and emergence of the "field" it is difficult to know where data analytics should call home. Or, should we accept it as a new discipline, as was afforded to IS at one time.

As such, degrees in data analytics are elusive as they cross-cut multiple concerns (Figure 1). Upon early inspection, one would find that there is no uniformity in the course offering of such degrees across Universities (content, course descriptions, requirements, prerequisites and transferability). Whereas more established disciplines - Marketing, Finance, Computer Science, and Political Science - have established a reasonable degree of consistency in their curricula.

While data analytics is certainly consistent with most Universities' mission statements, there are no clear imperatives that compel data analytics to locate in one area or another. Furthermore, even the modalities of delivery are neither suggestive nor limiting. Accordingly, digital learning, on-line programs, graduate programs and service to the local community – to attract professionals, continuing and life-long learners, or even alumni – are all also neither prohibitive nor suggestive. This paper's authors attempt to articulate a proposal of what a master's program in data analytics might look like. This section will proceed to share the broad strokes of the proposal and otherwise share our discoveries.

Program Modalities

Increasingly, accommodating a wide variety of delivery modalities is necessary. Thus, any of the following modalities is recommended:

- An on the ground program,
- An On-line program,
- A hybrid of on-line and on the ground program.

Proposed Degree Requirements

For the purpose of this paper, we surveyed a representative sample of more than 13 graduate programs and 8 undergraduate programs that offer degrees in Data Analytics, Business Intelligence, or Business Analytics. We observed that there is more uniformity in the course offerings at the graduate level as compared to the undergraduate. We compared the content of their courses, pulled as many syllabi as we could, read and compared their course descriptions. We summarized and compared their course contents. Although all of these programs share a common theme, the structure of the curriculum, the course requirements, prerequisites, course descriptions, computing technologies, focus and depth of offering widely varied. We offer this as an indication of a discipline in flux and under formation. The findings of this analysis are shown in Figure 2. Note that the MIT Sloan School of Management just introduced a One-Year Masters of Business Analytics program that is modular in nature (MIT-Sloan 2016). We were not able to collect complete descriptions of the Modules (beyond the Optimization Methods, Intro to Applied Probability, Data Mining, the Analytics lab courses and the Analytics Edge which is also a coursers.org course). Since we did not have complete information about the degree program, we opted not to include it in the graduate programs list.

From our review of these graduate programs, the following curricular patterns emerge.

- Graduate programs typically require a total of 30-36 credit hours as follows: 21-24 core credits plus 6-9 approved elective credits and a 3-credit Capstone Course.
- There is no uniformity of offerings across the undergraduate programs, some programs just rebranded and renamed their data warehousing ETL courses into Big Data-I and Big Data-II, or the Business Statistics courses into Data Analytics-I and Data Analytics-II.

Students from a computing discipline such as Math, CIS, CS, and Statistics may have 6 approved credits waived if they have completed the equivalent course work with a B grade or higher. Candidate courses are Programming, Data Management and Statistical Data Analysis. The courses for the degree are grouped into five separate categories as follows:

- Core Data Management: 3 Courses
- Core Statistical Data Analysis: 2 Courses
- Core Data Analytics: 2-3 Courses
- Core Capstone Course: One Course
- Electives: 2-3 Courses

Pre-Requisite Knowledge

Fundamental prerequisite knowledge from an undergraduate (or graduate if 2nd masters)

education would include knowledge of programming, statistics, and calculus. For students who do not have the background knowledge, they would either take leveling courses or use identified bridging courses which may include approved Massive Open Online Courses (MOOC) offerings where a certificate of completion satisfies the prerequisites that can be obtained.

The Graduate Education Component

In this section we explicate a provisional design for a graduate curriculum in data analytics.

1. Three Core Data Management Courses

1.1 Programming for Data Analytics
Pre-req: Basic Programming Knowledge

Description: Reading data from different data sources & streams such as files, web-searching, etc. Organizing, manipulating and repurposing data. Parsing-in and storing-out data JSON formats, string manipulation using RegEx libraries, Sets, Arrays and dictionaries.

Technology: Python, RegEx, DOM, JSON.

1.2 Data Management for Data Analytics
Pre-req: Programming

Description: Fundamentals of sound database design, storing, manipulating & retrieving data, Conceptual Data Modeling, SQL, Functional Dependencies, Data Normalization.

Technology: SQL, MySQL DBMS, and ER-Modeling tools.

1.3 Data Visualization for Data Analytics
Pre-req: Programming
Co-req: Statisitcs-1

Description: Provide an understanding of the different data types and their encoding schemes. Learn data visualization principles and Mantra(s). Learn how to tell a story through data. Learn how to detect insight through data, learn and utilize current technologies to visualize large data sets for the purpose of providing insight.

Technology: Excel, Tableaux, Web-GL, D3.JS, R-ggplot and R-Shiny.

2. Two Core Statistical Data Analysis

2.1 Statistics-I for Data Analytics
Pre-req: Business Calculus

Description: Probability distributions and their applications (geometric, binomial, Poisson, uniform, normal, exponential, t, F and Ki-Squared), Sampling Statistics, Confidence Intervals, Hypothesis Testing, Analysis of Variance and Linear Regression Modeling

Technology: Excel, R and R-Packages.

2.2 Statistic-II for Data Analytics
Pre-req: Statistics-I

Description: The different types of Regression Models and Time Series forecasting. The course emphasizes statistical computing.

Technology: Excel, R and R-Packages.

3. Three Core Data Analytics

3.1 Principles of Data Analytic
Pre-req: Stats-I, Data Management
Co-req: Data Management

Description: Exploratory Data Analysis, Statistical Models, Classification and Prediction, Clustering Analysis, Similarity Measures, Fitness of Models, learn how to use machine learning technologies to analyze data for the purpose of decision support.

Technology: Excel, R and R-Packages.

3.2 Advanced Data Analytics
Pre-req: Principles of Data Analytics, Stats-II

Description: Optimization Models, Social media analytics, Text analytics, advanced Analytics Algorithms like SVM, Neural Networks, bootstrap models, Model Validation.

Technology: R, R-Packages, Gephi and NodeXL.

3.3 Big Data Analytics
Pre-req: Advanced Data Analytics

Description: Big Data Meets Data Science, Meets Data Analytics. Map-Reduce Model, Apache Spark, Mongo DB, NoSQL Model and Scale out Models.

Technology: Cloud Computing, Apache Spark and MongoDB.

4. Capstone Course

4.1 Capstone Course
Co-req: Big Data Analytics

Description: Special Topics in Business Analytics with a comprehensive real world project, the project usually extends over 2-terms, a summer and the fall or the spring and the summer. Although the topics of the course are taught by one faculty and during one semester, a student might be working with another faculty from the program or from an approved discipline on their project. The project may be in collaboration with a partner organization or a business.

Technology: Whatever is needed for a successful project portfolio.

5. Three Elective Courses (More electives can be added)

5.1 Legal and Ethical Issues of Data
Prereq: Principles of Data Analytics

Description: Provide an understanding of the legal and ethical issues as it relates to data storage, retrieval access and sharing as well as analytics models. Copyright law, legal and ethical ramifications are at issue when recommending choices that have economic, social, environmental or legal impacts.

5.2 Project Management
Prereq: Principles of Data Analytics

Description: A data analytics project is just another software engineering project that will culminate in a software product. Deliverables, artifacts, timelines and resources need to be tracked and managed.
Technology: Project Management Software.

5.3 Decision Modeling
Prerq: Statistics-II

Description: Understand, formulate, solve and analyze optimization problems in the business domain and its operations. Utilize excel functions and macros to perform what-if analysis. Understand the geometric interpretation of linear optimization problems, Use solver family of packages to solve linear optimization problems. Formulate and solve Network graph types of problem especially in the social media domain.

Technology: Excel, Solver, Gephi.

In figure 4 a visual of the course sequences and their dependencies is presented.

3. TESTING THE ASSUMPTIONS – LESSONS LEARNED FROM TWO CASES

Student Data Analytics Competition Case

We continue our inquiry with a case description that illustrates some of the points made thus far about the nature of a data analytics curriculum and its relationship to the IS curriculum. The case is situated about a student data analytics competition held in New York City in the spring of 2016. The objective of the two-day student competition was to provide insights into a data-set that was made available from an online discount retailer that aggregates luxury brands and offers them at discounted prices. The student team had ten weeks to produce a poster that explains the nature of the data, the problems that surround it, and their insights into the data. The team's mentor (a coauthor of this paper) provided guidance and acted as a chief architect, coach, and project manager for the team. At the competition, the students presented their poster to a team of judges. Subsequently, after this initial round of judging, the students are given a new related data set that the team has not seen previously. Each team then had twelve hours in a reserved space to analyze the new data set to develop new insights, prepare and submit a presentation the next morning (No communication with the mentor was allowed). The team would then deliver a ten-minute presentation to a team of judges. Both the new analysis and preparation must have been completed within the twelve-hour overnight period. There were 18 teams competing from various North American universities.

The crux of the competition is to use the given data, and the context of the company providing the data, to bring technical solutions to business problems. During the 10-weeks period, the students and mentor approached the problem as though it were an IS development, project which requires: planning; skills development; computing resources; produce artifacts and deliver a product. The team of interest consisted of juniors and seniors, three members in total. Collectively, the team demonstrated sound business, analytical, technical skills and dedication. Salient to the competition, two students were enrolled in a data mining course during the semester of the competition. Relevant course topics included data mining applications, algorithms and technologies (using R, R packages, and Tableau). Further, at the start of

the project, the team was already familiar with Python and its APIs, Data Modeling and SQL, SAS, R, Tableau, and everyone knew Excel very well. From an Analytical perspective, the team was familiar with data modeling concepts, business statistics, statistical modeling, Finance, Marketing, etc.

As the project progressed, the team's depth of knowledge matured as well as an increasing awareness that more concepts, knowledge, and technologies were yet to be learned. Concomitantly, as their semester in data mining wore on, the team acquired more in-depth knowledge of R's data mining packages, ggplot (a graphing and plotting package for R), and Tableau (for visualization and visual analytics) Furthermore, the students learned SQL-Server Analysis Services Business Intelligence platform on the side and heavily utilized its capabilities into their analysis.

The poignant aspect of this case is the wonderful outcome whereupon this team won first prize in the competition. Thus, we present the case not only to characterize and celebrate the student accomplishment, but to highlight what can be learned from this experience on these main grounds:

- What can we generalize from the experience about a successful data analytics project?
- What are the implications of these generalizations on a data analytics curriculum?
- How can IS the discipline at large, incorporate data analytics into the curriculum?
- Lastly, what does IS have to offer to data analytics?

Upon reflection, the ingredients of the students' success can be attributed to the mix of student talent, mentoring, technology infrastructure, competency in underlying computing technology, and the utilization of data analytics skills with an eye for the foundational business problem. That is, the combination of these factors put these students in a good position to prevail.

As we generalize from the student's experience, it is important to note that their accomplishment was entirely their own work. Grappling with the new data set, the twelve-hour overnight drill, the insights produced, and the quality of the presentation was accomplished with no input from the mentor. While orientation, training, coaching and mentoring all occurred in the lead up, the student team ran the relay race.

Lessons from the Case

While the lessons from the case are myriad, a standout lesson certainly lies in the blend of skills utilized, the quality of the individuals involved, and the overarching perspective assumed throughout the competition.

First, the success of the project can be primarily accorded to focus on utilization of the correct computing tools underscoring the true nature of a data analytics project – it is still largely a software and systems problem. Knowledge of computing tools to analyze, clean, prepare and repurpose the data were required in addition to knowledge about the nature of data. Furthermore, the data is never encountered in a perfect state: that the data requires review, cleaning and preparation.

Further, a business and subject-matter orientation was adopted, which is often characteristic of many contemporary software and systems approaches – early and iterative delivery of working artifacts in close cooperation and partnership with stakeholders.

Next, the team was aware of a blend of competencies that we can generalize away from the competition setting and to several emergent concerns. The team understood the importance of APIs – addressing them, consuming them, integrating their outputs into their analysis system, understanding how API inputs could emanate from their system, etc. Often, these APIs are consumed through calls to REST services where JSON is the carrier of the data. The team understood the general processes surrounding software and systems development as well as the concepts, tools and techniques of data analytics. For modeling, statistics were important as well as the modeling techniques inherent in data mining. Finally, business acumen – an awareness of the business context of the problem and the need to integrate business-oriented decision-making into and out of organizational management IS – was a significant success factor. Through the poster and the presentation, they were able to tell a story, reveal patterns and provide insights.

Some of the final lessons from this case pertain to curricular and disciplinary concerns. In a previous section, the outline for a graduate curriculum in data analytics was supported by the outcomes of the case. The curriculum for data analytics must blend data management, traditional system development, data and statistical modeling, and the business context. As is the case with computing, software, and systems, these elements span a spectrum where a universal curriculum of data analytics may not coalesce cleanly. Some of these concerns may lean considerably into traditional computer science and software engineering and yet others

may lean towards the spaces occupied by IS. Additionally, some of the modeling may lean toward operations research. In the discussion, we shall elaborate further on how the bridging and spanning nature of the IS discipline are well-suited to provide leadership as data analytics emerges as an ongoing concern.

Twitter Text Analytics Case

The second case is an exposition on the requirements for a twitter text analytics research project that culminated in the case being published in The Case Research Journal of the North American Case Research Association. This is shared to highlight typical challenges faced when undertaking a type of research project typically used to characterize the power of data analytics. We highlight the challenges in what seems, on the surface, to be a simple and straightforward endeavor – using well-documented APIs to bring Twitter data into an application or data analysis context. It is a common misconception that Twitter data are ready, as is, for text and social networks analytics. Some software packages like *NodeXL (Hansen 2011)*, attempt to provide easy and straightforward access in the social network of a tweets dataset. However, in our experience, the matter is not simple unless the requirements for analysis are superficial. That is, repurposing Twitter data sets for analytics requires a wide variety of skills. Skills in programming languages like Python, in statistical packages like R and text analytics packages like R-tm and R-weka. Occasionally web-development skills are required for DOM scrapping of web-pages. This does not even account for the set of skills required to build effective systems for reporting, integration, and other interactions required to make use of this knowledge. Commonly, Twitter allows access to their data in multiple modalities:

1. ***Through the web-interface***: Users search content based on screen-name, hashtags, mentions, body of text, etc. They can read content, take notes, print pages, type counts (favorite, retweet, etc.) into an excel spreadsheet. Content is not captured into structures in digital formats where it is easy to manipulate. This has disadvantages based on how cumbersome this process is when large datasets are desired.

2. ***Through the Twitter-API(s)***: These are well documented and afforded programmers with extensive real-time access to Twitter's data. For instance, a programmer may use Python to retrieve JSON data structures which can be passed on to R for analysis. Some of the challenges with this modality would be learning the protocols of the Twitter-API, communicate, request and store the content. It is important to note that these are significant computing skills that need to be acquired in order to utilize this modality.

3. ***Subscription and purchase***: Based on usage agreements, users can purchase content from Twitter subsidiaries. Usually content is delivered in file fragments where each file may contain a bundle of tweets in JSON format plus some other trailing file meta-data that needs to be cleaned-up. These file bundles often need to be combined (and cleaned-up) in order to be useful.

The implication here is that the data will not move into and out of our data analytics systems without curation and coaxing.

Case Details

We continue with a discussion on how the Twitter data may be used in a typical data analytics context. In the project, we used Twitter data to analyze a crisis situation in a market-research study. We needed to have the full data set, we purchased 53,900 tweets from Gnip (a twitter subsidiary) that comprehensively covered 40 consecutive days of the hashtags "XXXXX" or "YYYYY". During the analysis, we learned more about the twitterers, their agendas, and their narratives. The primary twitterer, and the creator of one of the hashtags that went viral is Mr. John Dow. In this study, we wanted to know what John Dow's social media interests on Twitter were the day before he brought these hashtags to life. The challenge lies in the fact that the Twitter timeline API allows access to a limited number of historical tweets from a user's timeline and Mr. DOW is an avid twitterer the limited number of historical tweets was insufficient. Other than purchasing the content, it seemed that we could not answer that question. Initially, our only option was to scrape the data from twitter.com search. Using Google-Chrome with the advanced search option, we were able to display the tweets on the web-page. With Chrome Inspector, we pinned the content and saved it as html text document. Using Python, we wrote code that parsed the content of the file for the id(s) of the tweets, and then we used the Twitter API functions we iterated through the id(s), extracted the full content of the tweets. We were then able to perform the needed text analytics for the paper.

Lessons from the Case

The most poignant lesson to emerge from the case described above is the issue of federation. Data will not always cleanly answer questions, and data analytics fundamentally exists to facilitate questioning the leads to information and decision-making. There are two important "gravities" here: the need to work with computing tools for data manipulation, and the need for discretion in subject-matter expertise that informs the extent to which we will strive for the needed data. These worked together in the case in that the subject-matter was not the social data, but the knowledge of how data can be obtained and maintained.

4. CONCLUSION

In summary, to conceive of and design a Master's of Science in Data Analytics is to engage an emergent and multi-disciplinary phenomenon. We must embrace multiple imperatives and paradigms: the objective of which is for students to master, at least, the tools and techniques of both data science methods & their computing.

This objective requires addressing knowledge areas from multiple disciplines. Data Analytics represents the intersection of Computing, Statistics, and other disciplines from Humanities, Business, Science, Bio-Informatics, Learning Analytics, Natural Language Processing, Social Networks Analysis, etc. At the same time, a data Analytics project is a software engineering project that requires different people from different disciplines with different skills working together to build a data product that is useful, usable and maintainable. Although we do not expect everyone in the project to be as skillful, knowledge of analysis and design and project management principles is essential.

To build data products and to transfer data into insights that can be utilized, data engineers take large data sets from different sources that need to be repurposed, cross-referenced, analyzed and presented. The same project might require multiple computing machinery and machine learning algorithms to exploit the underlying structures of the data. Exploratory data analysis requires data visualization tools and dashboards, statistics and machine learning algorithms for the purpose of finding patterns that can be exploited within the underlying disciplines. Different data types require different types of repurposing techniques, analysis and discovery methods. Numeric data are statistical, social networks data are graphs, trees and associations' centric, textual data require natural language processing, named-entity recognitions and sentiment analysis. Being able to insure a reliable computing and hardware infrastructure is a challenge.

In conclusion, we hope that we made the case that a Master's degree in data analytics is the right place for IS educators start the assimilation of the data analytics phenomenon into their discipline, departments, and programs. The masters level is where the most holistic picture of what data analytics will mean for our discipline and its premise. We also hope that we provided a template and road map of a model curriculum for a Master's degree in data analytics based on our experience, research of the programs we analyzed. However, at the undergraduate level an extended minor or a co/dual-major (Programming. Data Management, Advanced Statistics, Principles of Business Analytics plus another elective) gives undergraduate students reasonable amount of knowledge and awareness of the application of data analytics into their area(s) of specialization.

Finally we even created a poster that highlights the different aspects of the degree program (Figure 5).

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Appendix

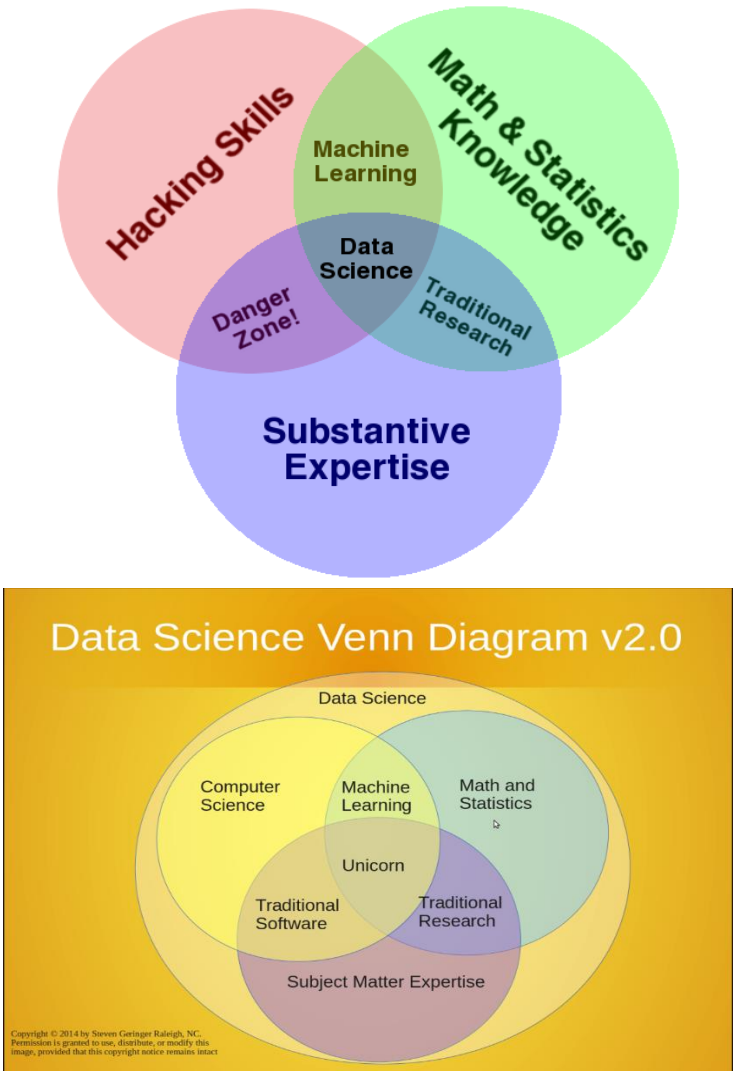


Figure 1: (Conway 2010, Germiger 2014) Data Analytics is Cross Cutting.

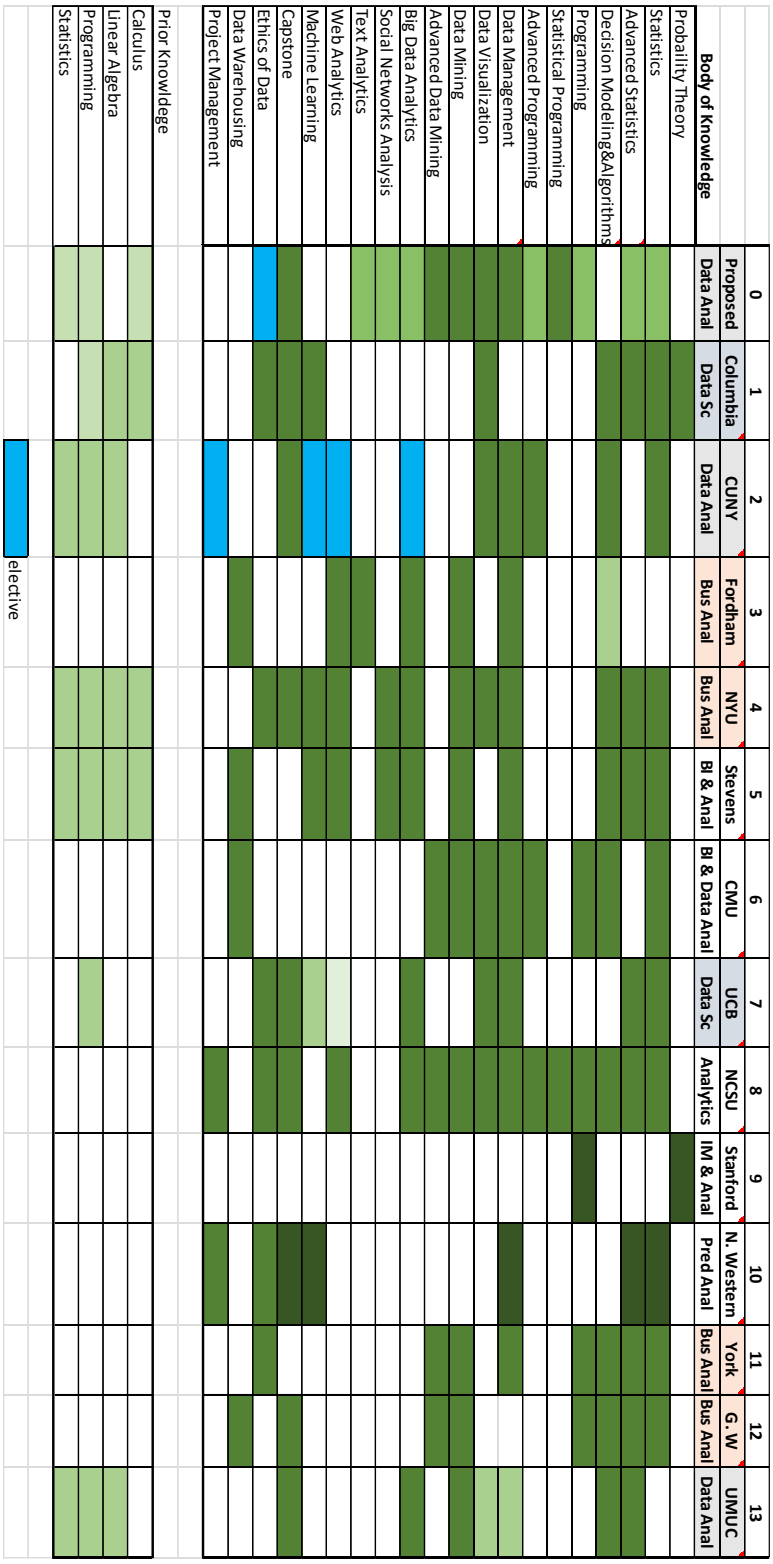


Figure 2. Topic map against existing programs, the darker the color the heavier the emphasis

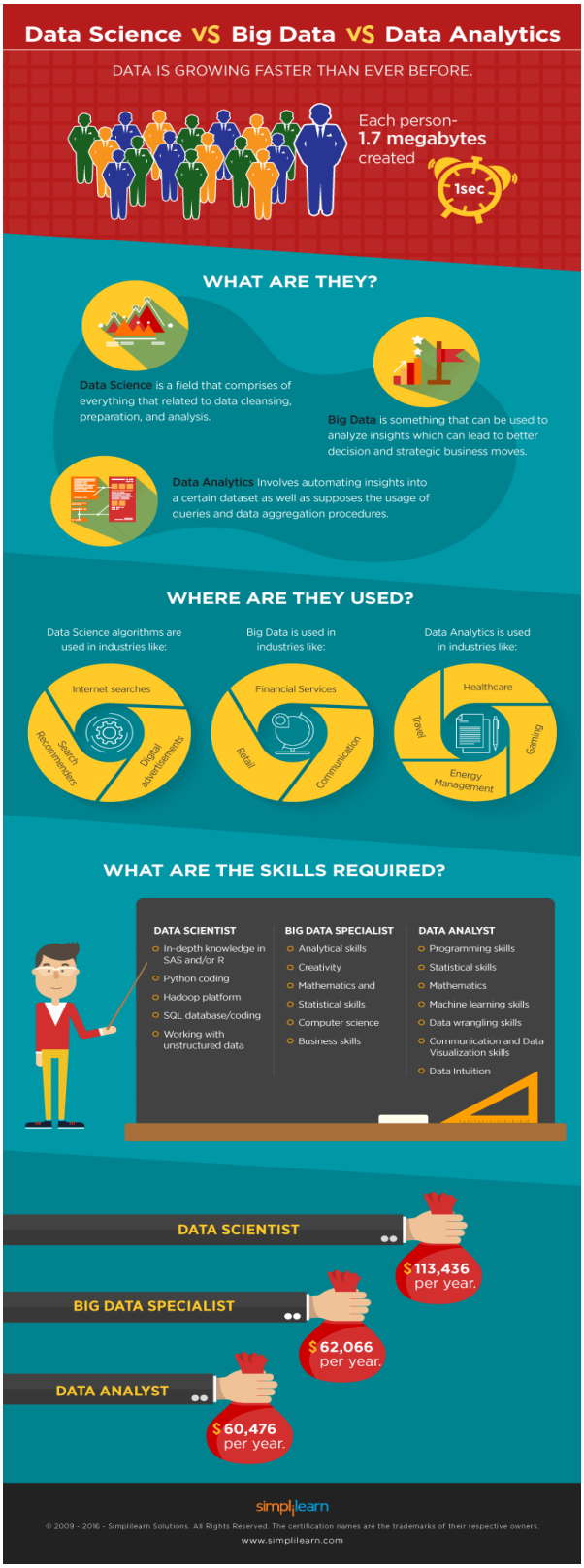
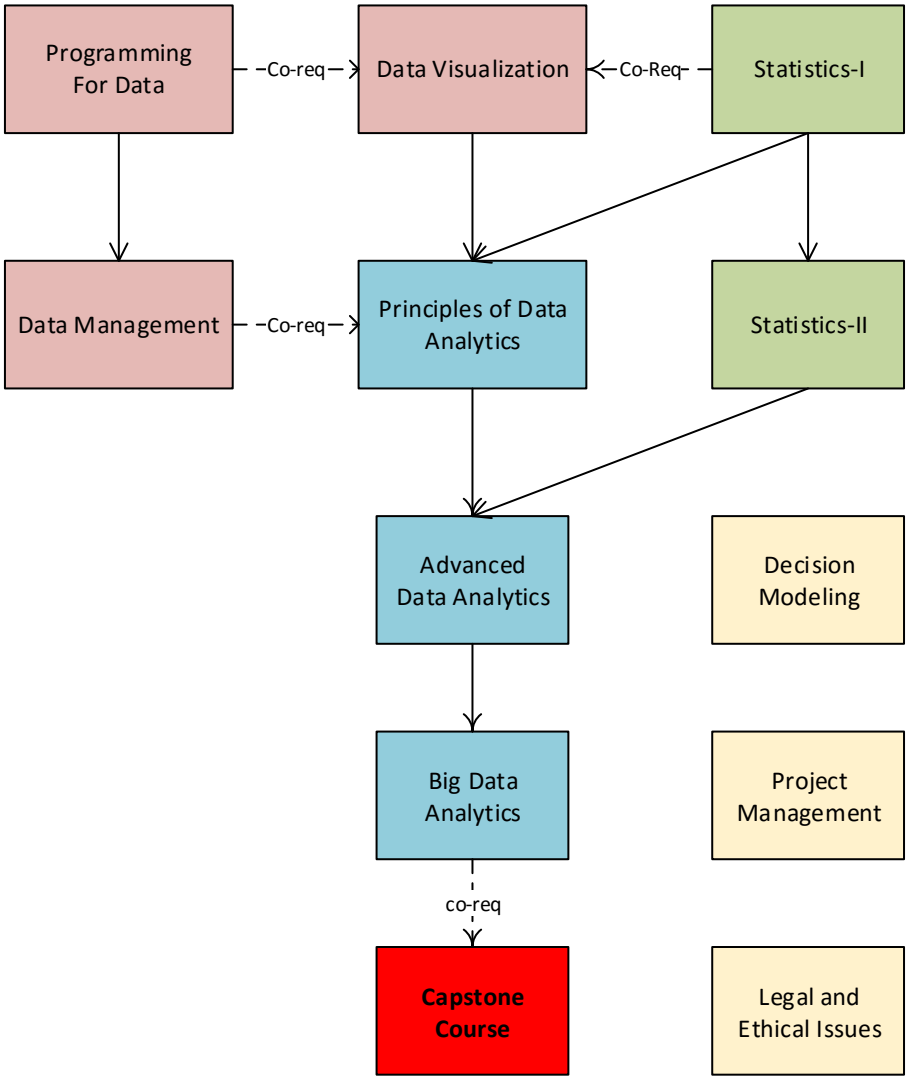


Figure 3. Differentiating the Problem Space
(http://www.simplilearn.com/data-science-vs-big-data-vs-data-analytics-article)



- Co-requisite courses can be taken concurrently

Figure 4. Course Sequences and Dependencies

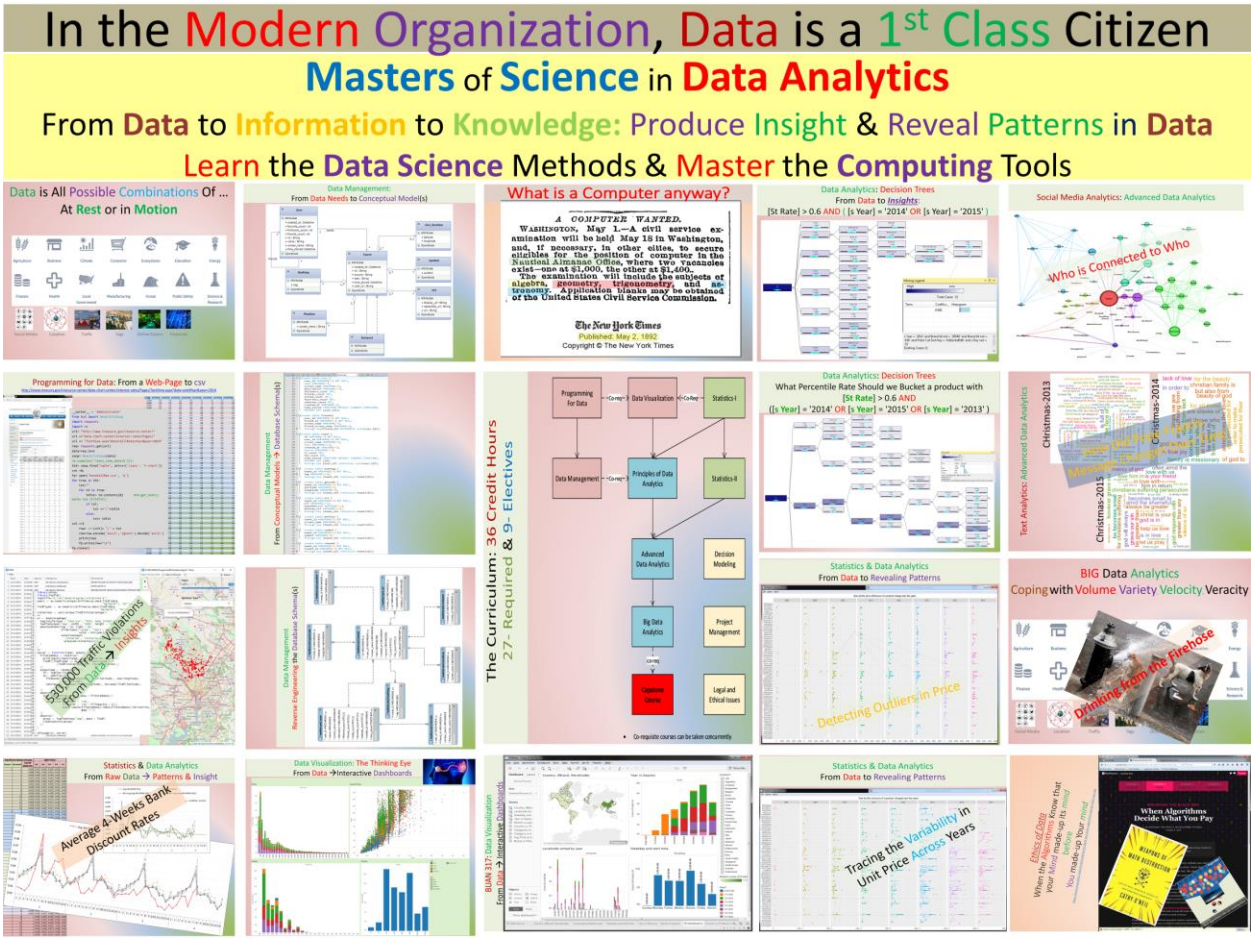


Figure 5. The Poster

Increasing Student / Corporate Engagement

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Abstract

Increasing dialog and interaction between the corporate community and students is a key strategic goal of many universities. This paper describes an event that has been specifically designed to increase student and corporate engagement. It describes the process of planning and executing a targeted career day for information systems and information technology majors. The results have been an increase in full time placements and internships for both undergraduate and graduate students. Additionally, the reputation of the program quality among employers has increased as well. Internally, career day has assisted in recruiting new majors to both programs.

Keywords: Community Engagement, Corporate Engagement, Job Placement, IT Major Growth

1. INTRODUCTION

There are calls for MIS and CIS curriculums to include more engagement between the corporate world and students. Both AACSB (2015) and ABET (2013) report guidelines for academicians to involve more corporate and real world experiences into the learning environments. Student and corporate engagement may take many different avenues to increase this dialog. A number of options include professionals speaking in the classroom, on the job training via internships/co-ops, real world projects from outside companies and even 'hack-a-thons' sponsored by various companies and advisory boards.

This article discusses one potential avenue for increasing engagement between students and IS/IT Professionals. We discuss the implementation of an annual Information Systems (or Information Technology) Career Day. The paper is structured as follows: a brief literature review concerning corporate/university engagement, a review of the history of the event, goals and set-up for the event and finally, the particular segments of the event and its results.

2. LITERATURE REVIEW AND BACKGROUND

In recent years, there have been numerous challenges facing many universities especially programs in business and technology. A fundamental challenge often cited concerns how to make education more relevant to students entering the workforce (Davis, 2013). Many times curriculum focuses primarily on concepts and theory without emphasis on application of the material. This had led many universities to advocate for more experiential learning which includes the involvement with the corporate

community working on real life projects (Gentry et al., 2015).

These types of community/industry partnerships are even more important for STEM degrees/programs such as information systems and information technology. Industry involvement is often the cornerstone of many successful STEM programs with calls to begin industry involvement as early as possible (e.g. the high school level) (Watters & Diezmann, 2013). Furthermore, this collaboration has been found to be even more important for technology related degrees (Stroud & Hopkins, 2016). However, the challenge can be how to initiate or increase industry collaboration. Davis (2013) suggests there are several ways to increase partnerships including trips to organizations, industry guest speakers, industry presence on-campus and internships with companies. The goal is for businesses to take a more active role in higher education.

One approach to accomplish many of these initial engagements is through the use of career fairs. Career fairs offer students the opportunity to interact with a variety of employers. Studies show that a significant number of students find more internships or entry-level positions through career fairs compared to electronically searching for positions (NACE, 2015). Career fairs also offer faculty and administration the chance to develop relationships with industry to help with curriculum development and research opportunities (Davis, 2013). Faculty have the opportunity to engage with employers to better understand what recruiters are actually looking for in students (Weeks et al., 2014).

However, a challenge many departments face how to even start a focused career day for IS and IT students. This research reports the experiences of a mid-sized (~15,000 students) public state university and how to successfully initiate a focused IS/IT career fair. The career day is based on two pillars from the vision for the university (Jenkins, 2016):

- Organize for effective engagement with the community and the world, and communicate efforts broadly and effectively and
- Invest in programs and services that support post-graduation success, such as career placement efforts and preparation for graduate school applications.

As a result of the call for more community engagement and to provide increased career placement efforts, the Information Systems Advisory Board recommended the development of an IS Career Day. The event was initially designed for IS majors (and prospective majors) to learn more about specific careers in the field. It also helped companies meet some of the best IS prospects for internships and full time placement. As a result, a half day event was developed to bring together industry and students.

3. GOALS OF THE EVENT

The event is now going into its eleventh year and has grown steadily from a small event (10 firms, 100 students) to last year's event having 34 IT firms, 20 IS alumni speaking and over 250 students. As a result of the success and growing number of participants, the goals have also grown. Currently, the goals are:

a) Increasing current students' knowledge of career paths in IS and IT
b) Increasing the number of majors for both IS and IT
c) Increasing the knowledge and reputation of the university's programs in technology
d) Increasing the number of internships
e) Increasing the number of full time job placements before graduation
f) Increasing the skills of our students
g) Self-fund the event

Each of these goals are accomplished through specific activities that occur on or before the actual event. These activities are described in the next section.

The Career Day event is composed of the following segments (an example of the event schedule is included in Appendix A):

1. Keynote presentation by a key corporate member (45 minutes)
2. "A Day in Life" presentations by recent alumni detailing their first years on the job in IS and IT
3. Interview / Information tables by selected IS and IT employers

4. CAREER DAY ACTIVITIES

Career Day is the mixture of several goals in one event. As previously mentioned, those goals are: the recruitment of new majors, helping current majors decide the best career path for them, industry engagement, company

interview/information tables and internships and job placements.

Keynote Speaker
The kickoff of career day is a keynote presentation by a high ranking professional in IS/IT. Prior speakers have included CIOs and Vice Presidents of regional companies. The keynote speaker generally focuses on skills they personally learned in college to help them advance and also how students can prepare for their first year on the job. The keynote speaker presentation averages 45 minutes in a large auditorium with all students and employers encouraged to attend. A key side benefit of the speaker is achieving the goal of self-funding the event as the keynote is generally selected from organizations that help sponsor/fund the event.

"A Day in the Life" Alumni Speakers
Following the keynote, there are 3 separate 25-minute breakout sessions presented by former alumni. These alumni discuss their specific careers and what they did during their first year on the job. This resonates well with undergraduates as they relate to these younger alumni and many students know them from previous coursework. There are multiple topics occurring at the same time to allow students to choose which topic most interests them.

The "Day in the Life" topics vary across different areas in IS/IT and include Business Analyst, Software Engineer, Quality Assurance Analyst, Data Analytics Analyst, and Network Engineer (see Appendix A for a complete list of topics typically presented). The goal of these sessions is to help juniors and seniors decide on a specific career path and to assist sophomores to determine if IS/IT is the correct career path for them. Each of the 3 sessions typically have 4 to 5 topics per session.

Another feature of the breakout sessions is to have current IS/IT students introduce the speakers. This helps students increase their communication skills while establishing a tie to young alumnus(ae). Students are recruited through the IS/IT club and are given an overview of what is expected of them during the event (see Appendix B for instructions given to students).

Company Information / Interview Tables
Following the breakout sessions, the heart of the event is 'speed interviewing'. Employers typically have multiple representatives staff an information table and students have 2 to 3 minutes to make an impression on the employers. The goal is for the student to learn more about our regional technology firms and also for our employers to quickly meet and determine if the student qualifies for another step toward employment with that firm.

The normal time frame for this event has been approximately 75 minutes, but key corporate college recruiters have told us that they receive more resumes from qualified students in 75 minutes versus 8 hours at a typical all day career fair.

Miscellaneous keys to success
Several other 'detailed' items make the event more successful:

- Food is a student motivator. We have found serving heavy hors d'oeuvres to be a great vehicle to get students to come to the event and remain at the event.
- Name badges indicating the year of the student and their major(s) help employers focus in on particular interview questions
- Dress code is business casual for students (ensure you define business casual for your participants)
- It is recommended that all majors carry resumes with them and they request business cards from all company representatives they meet.
- Faculty are expected to participate and encourage students to talk to specific employers. It is critical that faculty 'push' students toward specific employers as students can be reserved. A brief introduction may really break the ice.
- Provide all speakers with gifts

5. PRE-PLANNING

Coordinator pre-planning
The recruitment of firms is a key to success. Our event started with only 10 firms the first year and has grown to 34 employers last year. Even with only 10 firms, it was a success as many students received internships and full time employment from the event. A great place to start to recruit employers for the event is to reach out to college recruiters at larger firms, prior internship mentors and members of an advisory board. In addition, by extending invitations to present to young alumni, the employers of those alumni have started to attend and setup interview tables. We now do a 'save the date' email of our annual career day six months in advance to both prior and potential employers. We treat every

request for an internship over the year as a potential new employer for career day.

To pay for the event, we have explored a number of options including charging for interview tables and finding sponsors for the event. Firms are charged a minimal fee of $50 for their table. We did not initially charge firms for tables but we found that employers would cancel last minute as they had not invested any money into the event. In addition, we have recruited two key underwriters for the event. The event is now self-funded paying for all of the food, speaker gifts and any other miscellaneous expenses without asking the department for any funds.

To assist both the firms (in their recruitment) and students (in search of employment), an informative web site is key. The current site contains not only a list of firms participating, but the key attributes they are seeking for at their firm. A typical example would be: *interested in IS/IT juniors seeking an internship in software development, minimum GPA 3.0 and development knowledge with C# or pHp*. In addition to the company attributes, we post links to each of the firms' college hiring pages or the homepage of the company. This is to help students to research companies ahead of time to be prepared for the day.

Student pre-planning

We have found that including student clubs to assist in the event to be a successful approach. For many students, this may be the first time they are interacting with potential employers in a professional setting. The clubs are encouraged to have meetings in advance of career day where the following could be discuss (a sample of the information covered is in Appendix C):

a) Resume tune-ups
b) Your three-minute elevator pitch
c) How to learn more about the firms
d) Follow up to the events
e) Dress for success

We have also recruited career services on campus to help with the presentation. Career services spoke about basics from dress to how to shake hands. They even had a professional photographer taking head shots for LinkedIn followed by a short session on how to set up a professional LinkedIn profile.

6. RESULTS

Over its ten-year history, Career Day has been one activity that has increased the engagement between our corporate friends and our students and faculty. As a result of this event, our students are consistently getting jobs year after year. For the past three years, the IS major has averaged over 80% of graduates finding full time employment on or before graduation day. This percentage increases even more when measured at the 30 days after graduation. In addition to full time employment, over 70% of our graduates have a paid internship before graduation. Our percentage of internships prior to career day was less than 30%.

We are also above the national average pay for IS graduates. A nationwide survey in 2014 found that the average pay for IS starting graduates was $51,900 (Payscale, 2014). Our students graduating in 2014 made an average of $55,000. The starting salary in 2016 for MIS graduates directly out of school was $59,600.

The number of majors in the IS and IT programs has doubled since career day was started. Career Day was not the only reason, but the fact that we publicize that our students get jobs and internships has helped those students who have a passion for technology understand potential career paths more clearly.

From an employer involvement perspective, we are now on the 'target' schools list for four Fortune 500 companies. Being in a city of only 160,000 people and 2 hours away from the closest Fortune 500 Company we consider a real achievement. The average recruiter travels more than 2 hours to come to our event.

A number of other benefits have occurred from Career Day. Many recruiters have begun to come to classes to talk about the company and opportunities in IS/IT. For example, a company looking for developers will come to speak to the development course during the day of Career Day. They often discuss how the topics covered in the class relates to their existing position which provides course relevancy for students. They have also talked with introductory courses which has encouraged many students to consider IS/IT as a major.

In addition to speaking in class, recruiters from career day have also invited students to travel to their businesses. This has resulted in two annual trips in which more than 50 students get to visit

a variety of companies. In fact, students have even received interviews and job offers based on attending these trips.

Finally, a future recruitment tool being discussed is filming the day in the life presentations. This would be especially helpful in the introductory courses in which students often don't get a good understanding of what a career in IS looks like.

7. SUMMARY

This article described an event to assist in full time job placement and internships for IS/IT majors. After ten years, the school's reputation among Information Systems and Information Technology majors has significantly increased. Engagement with the business community is at an all-time high and some regional employers post jobs just within the department and not campus wide. Overall, career day has helped the number of majors to increase through industry engagement. Our student's now have a better understanding and knowledge of careers in the field.

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Editor's Note:

This paper was selected for inclusion in the journal as the EDSIGCon 2016 Best Paper. The acceptance rate is typically 2% for this category of paper based on blind reviews from six or more peers including three or more former best papers authors who did not submit a paper in 2016.

Appendix A:
Sample Career Day Schedule

10th Annual Information Technology / Operations Management Career Day

Schedule

3:00 to 6:00 PM – Speaker and Employer Check-in/Reception

3:30 to 4:05 PM – Keynote Speaker
Everyone welcome – will discuss skills important to all new professionals

4:15 to 4:45 PM – Breakout Sessions (Select one topic of interest to you)
Topics Included: Software Developer, Project Manager, Interview Skills, Leadership Program, Systems Engineering, Business Analyst

4:50 to 5:20 PM – Breakout Sessions (Select one topic of interest to you)
Topics Included: Systems Administrator, Quality Management, Software Developer, Employment Seeking Tips, Leadership Program, Finding Positions as a Graduate Student

5:25 to 5:55 PM – Breakout Sessions (Select one topic of interest to you)
Topics Included: Software Developer, User and Production Support, Cyber Security, Project Management, Internships, Systems Analyst/SCRUM Developer

6:00 to 7:15 PM – Interview / Information Tables
- Everyone welcome
- Meet employers looking for interns as well as full time employees
- Practice your interview skills, learn about opportunities and mix with employers, students and faculty

** Note: For anonymity, some of the scheduled was removed for review purposes. The actual schedule printed for students includes the following:*

- *Each Breakout Session is listed in a separate table and includes a list of the topic, majors of interest, and speaker information.*

- *An additional table is also included that lists all of the companies who have interview tables, contacts at the company and majors hey are interested in hiring.*

Appendix B:

Student Host Check Sheet

1. Pick up speaker(s) biographies, speaker(s) gifts, attendance sheets, and "5-minute warning" card at registration desk.
2. Introduce yourself to the presenter(s), make them feel comfortable; tell them where the rest rooms are located.
3. Escort speaker(s) to assigned room.
4. Assist speaker(s) with audio-visual.
5. Set up attendance sheet for students seeking extra credit.
6. Take an actual count of the number of attendees (in addition to the attendance sheet).
7. Introduce speaker(s).
8. Sit in back of room. Cue the speaker(s) when there are 5 minutes remaining by holding up the "5-minute warning".
9. Thank the speaker(s) and give gifts.
10. **BE SURE TO REMIND STUDENTS TO TAKE THE SURVEY!**

*******Return this sheet and the attendance sheet to the registration desk********

Topic:_____

Number of attendees: _____

Appendix C:
Student Career Day Prep

1) Dress – business casual at a minimum

There are many good online resources that are included during the presentation to students. You can also have the student club officers dress up for the meeting to demonstrate what is appropriate to wear.

2) Pre-Career Day Preparation

a. Visit the career day website and have a plan

b. Details are included about what each company is looking for – know what you are interested in or what to ask about further

   i. DO NOT ASK WHAT THEY ARE HIRING FOR UNLESS YOU CAN'T FIND IT ON THE WEBSITE (we normally include all positions for each company)

c. Also, look at some details about the company itself

   i. Be able to go up and talk to employers about what you like about the company

   ii. DO NOT ASK THEM WHAT THE COMPANY DOES (find out ahead of time, you will have time while waiting in line to review any notes about the specific company)

   iii. Ask questions to find out more about what they are doing now (e.g. projects they are working, what is coming down the line, etc.)

d. Create a list of employers you want to visit and jot down the notes/topics you want to bring up with them.

   i. Rank them so you know who you want to be sure to talk to

   ii. For practice, try one of the companies further down the list. This will help you get comfortable with talking to employers to be ready for the number 1 company you want to work for.

e. Resume – be sure to have multiple copies of your resume.

   i. Technical resumes are a little different than what you are taught in your introductory business courses.

   ii. Highlight skills/knowledge – go through the courses you have taken thus far and be sure to include these in the skill section.

   iii. Look for something that might set you apart (Previous work, hobbies that relate to technology, etc.

Student Veterans' Shared Experience Using Social Media in Higher Education: A Pilot Study with a Hybrid Phenomenological Data Analysis Method

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Abstract

This study emphasized understanding how student veterans experience and what they do with social media. Student veterans typically have a much different college experience than nonmilitary students. A qualitative method was used to perform this research. The researcher adapted Colaizzi's and Moustakas's phenomenological methods to create a data analysis approach that fulfilled the needs of this study. Student veterans were interviewed with questions developed to attain their shared experiences. The research established that student veterans are using social media as a tool to communicate, build relationships, and seek assistance. They are having helpful experiences with social media to achieve their educational success.

Keywords: Student Veterans, Social Media, Higher Education, Phenomenology

1. INTRODUCTION

Social media is being used by students in the context of higher education. Researchers such as Neier & Zayer (2015), Bal, Grewal, Mills, & Ottley (2015), Alsurehi & Youbi (2014), Chauhan & Pillai (2013), and Knight, Rochon, & Hailey (2015), have highlighted the importance of understanding higher education students social media usage through their research. Yet there is limited research focused on how student veterans use social media to assist them in higher education. Student veterans can have a much different and difficult experience in higher education when compared to nonmilitary students (DiRamio, Ackerman, & Mitchell 2008; Jones, 2013; and Vesilind, 2013).

This distinctive experience is due to the challenging transition from military to college life. Therefore, it is critical to understand how student veterans' experience in higher education is affected by social media. The support that social media offers matches with the support that veterans can require (Wilson, 2014; Wilson, Smith, Lee, & Stevenson, 2013).

Research Questions

The central question that guided this study was:
RQ: What is the shared experience of student veterans who use social media in the context of higher education? The research question had three sub questions:

SQ1: How do student veterans use social media?
SQ2: How do student veterans perceive that they benefit or could benefit from using social media in the context of their higher education?
SQ3: How do student veterans' perceive peer networking through social media in higher education?

2. LITERATURE REVIEW

Student Veterans

Veterans earn their education benefits by serving in the military, but this service puts them at a disadvantage in the civilian academic world. Military service is a very unique experience; although many experiences are often positive, veterans typically find it more challenging pursue civilian education (Vacchi, 2012).

It is a significant culture shock to go from military culture to academic culture. Student veterans are not used to the level of self-responsibility that higher education requires for success. This transition can make veterans feel that going to school is the most stressful experience that they will have in their lives. The lack of a strong support structure and chain of command makes it more difficult for them to receive the support that they have been shown in the military. They typically do not fit in with the traditional students, as veterans can be older or more mature due to their military experiences (DiRamio, Ackerman, & Mitchell 2008; Olson, Badger, & McCuddy, 2014).

The cultural differences greatly impact this transition for military members. Hofstede's cultural dimension of Individualism vs. Collectivism has been used to show the conflicts of academic and military cultures. This dimension ranges from individualistic, where members of the group are highly independent, to collectivistic, where members of the group rely on one another. Academic and military cultures are ideal examples of these opposite ends of the dimension. Academic culture is one of individualism, where students are responsible for getting themselves to class and completing their assignments with little or no unsolicited assistance outside of the classroom. Conversely, military culture is collectivistic, where members are dependent on each other, look out for one another, and have a great deal of direction from authority. Additionally, student veterans typically cannot relate or interact well with traditional students who have the mentality of individualism since student veterans are used to working with those who have a team mentality (Hofstede, Hofstede, & Minkov, 2010; Starr-Glass, 2013).

Social Media as the Support Bridge

Individuals are using social media to build peer support. It is helpful for peers who share similar challenges to support each other. It allows them to bond and feel a sense of group belonging. Those with brain injuries and mental illnesses use the Internet to blog and to bond with peers. Common themes emerged from this peer bonding method, including a minimized sense of isolation, coping with day-to-day problems related to mental ailments, finding support through peers, and sharing tips for medication and healthcare. The opportunity to share struggles, common experiences, and to have a network of people who have had similar experiences provides positive benefits through peer support (Naslund, Grande, Aschbrenner, & Elwyn, 2014).

Social media has allowed students to participate in a different type of learning experience. Cilesiz (2010), quoting Jonassen's research, states ''since experiencing a mediated event is substantively different from direct experience of an event, the resulting phenomena or conscious perceptions must be substantively different'' (p. 166). Social media has a distinct impact on the learning environment. While Cilesiz's research focuses specifically on using social media to instruct teachers on how to teach, he stresses how phenomenology is used in terms of understanding the academic world and students' experiences with social media. The learning theory created by Dewey (1938) emphasizes that learning takes place in experiences of the individual. Social media can influence individuals' learning experiences by altering their attitudes and preferences through a social media frame (Cilesiz, 2010).

Social Media and Student Veterans

Pittsburgh area student veterans, which were the area of study, most preferred method of communication for sharing benefit information was orally. Their response was different from non-student veterans. The student veterans' top three responses to usage questions did not contain social media as a preferred method, where other veterans did have social media in their top three preferred methods of communication (Stevens, 2012).

3.0 RESEARCH METHODOLOGY

The qualitative research approach was used with a phenomenological framing and data analysis process. The phenomenological data analysis implemented was adapted from two different data analysis processes. The main data analysis methodology was founded in Colaizzi's (1978) phenomenological data analysis process, depicted in Appendix C. The "construction of phenomena" data analysis steps were adapted from Moustakas's (1994) and Yuksel & Yildirim's (2015) approaches, illustrated in Appendix D, and combined with Colaizzi's data analysis process. This hybrid methodology, shown in Appendix B, was created to utilize Colaizzi's methodology while adding the textural and structural dimensions of Moustaka's (1994) and Yuksel & Yildirim's (2015) analysis processes, as that was determined to be the best method to analyze the data.

Population and Sample

The criterion purposive approach was thought to be the best suited purposive approach for this phenomenological study. The criterion purposive

approach ensures that the participant satisfies specific criteria (Cilesiz, 2010). The required criteria for this study were that participants were student veterans who use social media. The researcher worked with a university's Veteran Center, from the Pittsburgh, Pennsylvania area, to ask for volunteers. The researcher used two sampling methods, starting with the criterion purposive approach, but had to turn to the snowball sampling method to obtain two more participants to reach the minimum sample size of 10 participants (Bryman, 2012; Cilesiz, 2010). The snowball sampling method is where current participants recommend other possible participants who meet the criteria (Emerson, 2015).

Data Collection Method

The data collection method was done through semi-structured interviews with the participants. The semi-structured interview protocol was used for this study. This protocol ensures general consistency during the interview process (Doody & Noonan, 2013). The interview protocol for this study consisted of six questions and some probing questions to assist in the interview process. The interviews averaged 30 minutes, which is why they were not considered in-depth interviews. The interviews were recorded for transcription purposes.

Data Analysis Process

The data analysis process started with bracketing the researcher's subjectivity. This process is labeled bracketing, or epoché, and it refers to the researcher setting aside his biases of the phenomenon. Bracketing is a consistent theme in phenomenological research. Moustakas (1994) insists it is important for the researcher to remove his preconceptions of the phenomena in order to be able to truly understand the participants' experience of the phenomena. The researcher wrote down his experience of the phenomena in order to identify possible preconceptions. These preconceptions were reflections of how the researcher positively experienced using social media for higher education to build a support network.

The interview transcriptions were used to perform the data analysis. Colaizzi's (1978) phenomenological data analysis steps were utilized to begin the process. The first data analysis step the researcher took was to read and reread the transcripts. This process ensured the researcher had an overall understanding of the essence of the transcribed interviews. The next step was extracting the significant statements from each transcript that relate to the phenomenological experience that is being investigated. Significant statements are the statements that depicted the essence of the experience from the participant's interview responses. The researcher then formulated themes or meanings from the significant statements. These themes or commonly shared perceptions were than categorized into clusters of themes.

At this point, the researcher found it more appropriate to combine the 5th and 6th step from Colaizzi (1978) and an adapted version of the fifth through seventh steps of Yuksel & Yildirim's (2015) and Moustakas's (1994) phenomenological data analysis procedures to construct the "what" and "how" of the experience to construct the phenomena. The researcher analyzed the clustered themes by what and how the phenomenon was experienced. These two construct composites were used to synthesize the shared experience of the phenomenon, which is described later in this study. This was the best method for the construction of the phenomenon and assisted in creating an in-depth description of the shared essence of the experience.

Validity and Reliability

The purposive sampling approach was used to ensure the participants have experience with the phenomena being investigated. The phenomenological bracketing process performed by the researcher also ensures validity of the data and data analysis by eliminating the researcher's bias (Neuman, 2003). The interview protocol was screened for its effectiveness through the face validity approach. Face validity is a method that examines the questions to see if they obviously measure the variables that they are supposed to measure (Gravetter & Forzano, 2012). The qualitative questionnaire data analysis was tested for reliability by the intercoder reliability test. This reliability test has a second coder review the data coding that was originally performed to determine if the data coding was done in a logical manner. The steps taken for validity for the piloted hybrid methodology was having the participants review the study results to ensure it accurately reflected what they wanted to relay. The participants did validate that the data analysis and results aptly depicted their experiences (Compton, Love, & Sell, 2012; Riege, 2003).

4.0 DATA ANALYSIS RESULTS

Demographics

The participant group was made up of three females and seven males. There were an even mix of undergraduates and doctoral students,

each category having five participants. The participants' age range was from 19 to 50 years old. All of the participants were Caucasian, which limited the diversity of the study in terms of race. While the request for participants was sent to a diverse population, as stated earlier, only 10 student veterans volunteered to participate for the study. Due to time restrictions, additional attempts to gain diverse participants could not be performed.

The Shared Experience.

The shared experience of student veterans employing social media in the context of their higher education was described by the two dimensions of "what" and "how" and then a synthesized description of those two dimensions. The "what" and how" dimensions are similar to the two dimensions of a phenomenological experienced discussed in Yuksel and Yildirim (2015): the textual component and the structural component. The "what" relates to the textual dimension, as in the objects of action, or what had occurred. The second dimension is "how," which relates to the structural, the act of the experience. The clusters were built from similar themes under one general category or cluster as part of the phenomenological data analysis standards (Moustakas, 1994; Yuksel & Yildirim, 2015).

4.2.1 Cluster of "What" Themes. The main themes for what was experienced were: Communication, Information, Relationship Building, Collaboration, Recreation, and Usage. Communication was the most common cluster of themes. There were 115 of the 305 "what" theme occurrences of social media being used for communication by the student veterans, which are illustrated in Table 2. Participants discussed their social media experiences with communicating with peers, communicating with teachers, and communicating with other student veterans or veteran specific websites. Another theme that fit into this clustering was face-to-face communication. Participant 5 had a similar experience with social media to communicate with peers, stating:

"Twitter, I actually used it last semester. There's a girl in my class and we didn't have each other's numbers. We weren't friends on Facebook but we called each other on Twitter. So for assignments and stuff we would you know, tweet each other or PM each other about a quiz or projects. We didn't have a number, we never talked to get each other's number, and we just used Twitter basically to communicate."

The next cluster of themes was Information. Sharing information and accessing information about school were the two themes that discussed information the most. These themes identify participants' experiences where social media was used to share or retrieve information. This cluster relates to communication, but the experiences that the student veterans described here did not necessarily have to do with communicating back and forth. It could just be going on social media to retrieve information or simply to input information to the social media platform without a response. Participant 2 shared one of his experiences with sharing information stating that:

"I definitely use WhatsApp. That's more for me, an academia perspective. Typically, I'll use WhatsApp to communicate with my colleagues, and that's also a very professional site as well. It's one of those where we are sharing different things about our thesis or about ideas of professional papers that we would like to publish, but that as well crosses the boundaries of all media."

Relationship building themes was the third clustering of themes. The two themes of peer bonding and networking were clustered together as they both focused on relationship building. This cluster addresses research sub question 3, discussing how student veterans use social media to perform peer networking or bonding. Participant 3 describes one experience he had that enabled him to network and bond:

"There's a fraternity up here that contacted me. They are actually trying to restart this fraternity up here I think. They contacted me through social media and I am not really sure exactly if I wanted to do it but I did meet a few guys through social media through that. Another group, WeChat that I am in, that's another way that I made a few new friends up here talking to them through that."

Collaboration was the fourth theme that emerged from the data. This clustering of themes was comprised of the three themes, researching, assistance, and feedback. Student veterans used social media to perform research for higher education. This theme is for when students are expressly searching or communicating on social media for the purpose of getting help with school. Participant 5 was able to communicate and provide assistance and feedback with another student through social media. Participant 5 expressed this experience by stating:

"It was just easier to communicate through Facebook, we saw each other on our Facebook, 'Hey, I just wrote this. Does this sound good?' And she would respond right away like, 'Yes, that sounds great.' 'Hey, check out this website. It has a lot of information about the essay that we need to write' and vice versa. Instead of texting or any of that, we could use Facebook for us to see each other online at the same time."

Recreation was another theme that emerged when having a discussion with the participants on "what" they did on social media. Recreation was typically not an experience that was done to help with schoolwork, but was done due to attending school. Participant 8 described some of the types of recreational activities that can be experienced. This is just one of the significant statements that were made, exhibiting that student veterans use social media to take a break from higher education responsibilities.

"I've used Facebook and Snapchat as kind of a break for when I'm studying. Like if I've been studying for a maybe an hour to one end I'll take a ten or so minute break every so often just to help my mind relax and help myself absorb information that I'm studying or researching."

Usage was the last major theme that participants discussed in the interviews. It was comprised of the significant statements that described their experiences with the general use of social media, not a specific feature of it. The common usage theme of security concerns was very well illustrated by Participant 6's comments on the experience of security, stating that:

"I'm so used to having security clearances. I'm so used to living in the shadows and being that protected communications person. Operation security at all time. You don't let anybody know anything that's going on. Even though I'm in the civilian world, I have a tendency to do that now. Using the social media for anything and even my VA benefits, anything to find out information. I think I'm a little guarded about it, because the ability of others to see the communications, they may not mean to see it."

4.2.2 Clusters of "How" Themes. After identifying the emerging "how" themes, the next step was to cluster these themes of how student veterans experienced social media usage. The four clusters that emerged from this step of the analysis were helpful, peer-related themes, relaxing, and informational.

The most dominant "how" theme was helpful. This cluster of themes was comprised of how students experienced social media as helpful for their higher education. Overall, 144 out of 210 themes that emerged were concerning how social media made their experiences performing different actions as helpful, specifically for class situations, convenient for their experiences with higher education, and was useful in these doing actions through for some aspect of school. Participant 1 describes his helpful experience with social media, alluding to multiple "what" themes, including collaboration, communicating, and finding information. Participant 1 described the experience by saying:

"You could get in touch with people that you wouldn't be able to otherwise. It's a little bit anonymous too, because you can create a profile that all you do is write papers and post them and if you cover your name and all your information, nobody knows who you are. So, it's a little bit easier to seek out help, I think, than coming here to campus and asking faculty members to meet with you part time about this, maybe, I don't know. It's 24/7 and you can get - it's easier to solicit information from here than I would be just meeting somebody. I would say, it's definitely very helpful to me educational-wise and I'm still trying to find something."

Peer-related was an element of "how" social media was experienced in the process of communicating. Whether it was communicating with peers or sharing information with them, participants described these experiences as essential to keep in touch with peers. Participant 7 was able to relate to peers through social media sites. Participant 7's perception was that:

"I think social media, particularly, WhatsApp, LinkedIn, which I use, personally, since I do not have a Facebook account that really helps me keep in touch with other classmates for our educational program, which is an executive style format. We don't meet on a weekly basis or a daily basis all through the semester. We meet only once a month face to face. And so I think that the use of social media is a great benefit to keep in touch, to talk with other people and to see what's going on, what troubles they're having, both personally and academically. You have somebody stuck, that they don't understand an assignment or they can't find a reference, and they need some motivation or some instruction or a pathway to get to wherever they need to go; a reference. Then, you can use social media that way."

Social media was able to make the experience of higher education more enjoyable. Student veterans discussed their need to take the time to do something they enjoy, which happens to be utilizing social media sometimes just to be entertained. Participant 3 describes their experience with using social media for enjoyment:

"I was doing a project for my business class and one night I was up pretty late doing it, I was having a lot of trouble with it and I just found myself, I wasn't focusing on the project anymore. I couldn't even stay focused and think anymore, so I took about a half hour, 45 minute break just to let my mind recuperate. I went on Snapchat, different social media."

Participants made significant statements that revealed that their perceptions of their experience using social media to access, share, and retrieve information was informational. Typically they perceived they were able to gain knowledge or come away from the experience more informed. Participant 7 described how social media was able to create informational experiences. Participant 7 stated that:

"I use social media most recently to look up videos for research tools such as Nvivo or SPSS. Those are the most recent examples. Other examples, go back if I needed to watch a lecture or a snippet on any particular topic of interest that I have either for my own educational purposes or for a classroom assignment. For example, I was asked to participate in another survey for another doctoral candidate, and they were talking about Peter Singe's The Fifth Discipline. I went on YouTube to see if there was any lectures on The Fifth Discipline, and there were. I was able to view those and get some background of what The Fifth Discipline was. That's one example. I also used SlideShare, which, I guess, is also a social media tool to get some slides on The Fifth Discipline."

The next stage of the analysis was synthesizing these two different dimensions of the shared experiences into one comprehensive narrative that describes the student veterans' synthesized experience with social media. The researcher combined the shared common themes of "what" student veterans used social media to do with the common themes of "how" student veterans experienced social media. The narrative of this synthesis is then supported through significant statements made by the participants.

4.2.3 Synthesized Experience. The synthesized experience described how social media was able to provide student veterans with beneficial experiences in communicating, building relationships, dealing with information, and getting direct help with school work. These experiences were helpful and brought them closer with their peers. Student veterans felt relief from stress and connectedness by being able to have such convenient access to the support social media could provide to them. Participant 9 made a significant statement that illustrated social media's impact to a student veteran's experiences. In regards to social media's potential, Participant 9 shared:

"Having access in this, even ties into LinkedIn through unique groups that focus on veteran's transition. You realize that – not necessarily realize, but you come to the understanding that you're not the only person who's facing whatever occurrence, or struggle, or transition that you're going through. You realize that, 'Hey there's some hundred thousand people going through this transition as well,' and you have access to them with a keyboard or a touchscreen. And you can engage them in conversation, find resources, find ways to share what works for you."

5.0 DISCUSSION

The emerging themes from the qualitative interviews provide an understanding of the shared experience of student veterans using social media. These "what" and "how" themes were synthesized to provide a detailed rich description of this experience by student veterans. The interviews clearly show that student veterans perceive they are definitely benefitting from the use of social media in higher education. Their experiences with using social media have made their transition and progress in higher education easier. All of the participants in this study have experiences with all at least one social media site daily. The essence of the shared experience by student veterans highlights the unique tools that social media provides to this population to help them succeed in higher education. This transitional experience can be stressful. As their experiences have alluded to, social media has improved the transition by providing a sound means of communication. Table 3 illustrates these main "what" themes along with the main "how" themes in the Findings section to describe the experiences described in the Section 4. This displays the main themes that were discovered in this research, supporting that student veterans were able to gain these beneficial experiences through the use of social media.

Findings

Student veterans are having positive experiences with social media. It should be a priority of the schools and student veterans to utilize social media. Schools should have social media sites that help students to connect with peers and build a school community. Student veterans should be using social media to build social networks that can provide support or use a social network for assistance. As there are different features from social media, schools should focus on the emphasizing the use of social media sites that connect students and build networks. Examples of these sites would be Facebook, LinkedIn, Twitter, and other sites that are geared towards building networks.

Student veterans are using social media to retrieve useful information from social media; they believe this is one of the most convenient methods of communication. Schools should ensure that they are making an effort to allow students veterans to benefit from social media. Other veteran services should also raise awareness of their social media services offered to student veterans and alleviate the concerns veterans have in using these services. The veterans' agencies that work with schools such as the VA should ensure that they promote the use of their social media to engage students. Social media is innovating learning and sharing information; student veterans need to be utilizing these innovative means of learning.

Significance of Study

This research contributes to the current body of knowledge of student veterans. It provides the understanding of student veterans' experience of using social media. Social media offers opportunities that can assist student veterans to hurdle the challenges that are encountered during transition. These challenges of isolation, difficulties bonding with peers, and the lack of communication and support can be conquered through communication and peer bonding experiences via sites like Facebook and WhatsApp. This research shows that student veterans perceive that they can receive several layers of necessary support through social media. Understanding student veterans' perceptions of social media could lead to better engagement, if they are having a positive social media experience. Therefore, student veterans should be engaged to utilize social media in higher education.

Limitations

One of the limitations of this study was the lack of diversity for the student veterans. While the group was various ages and almost equally represented genders, there were only Caucasians as participants. Also, there were no graduate level student veterans, only undergraduate and doctoral level. A more diverse set of participants could have led to more accurate data representing student veterans.

Recommendations

One of the next steps that would supplement this research would be to do a comparative study on the experiences of nontraditional and traditional students. This would explore if there were significant variances in the perceived benefits and experiences with social media use between the two populations. Further research could also focus on understanding the differences in perceptions from the different age groups of student veterans using social media. As this research uncovered, there may be different perceptions among age groups of student veterans when it came to some of the different features of social media used in higher education. This understanding could provide more information to institutes of higher education to better promote social media use to student veterans.

Conclusion

The student veterans interviewed expressed they have very constructive experiences with social media. They addressed how they view social media usage differently based on their military experiences, for the example the distinctive mindset for controlling information security that comes from military duty. These experiences are often times helpful and convenient to the student veterans' needs and schedules. The 10 student veterans were able to take advantage of the benefits that social media offers to the realm of higher education. These student veterans were able to rely on social media to extend their support network. This enabled them to relieve some of the stressors of transitioning into higher education and helped them flourish throughout their educational journey. With additional exploration, research could establish if there is a significant variant between student veterans and the other subpopulations of students in respect to the benefits they feel they receive using social media in higher education. I would speculate that the type of benefits would be similar, but student veterans could gain more from the experience, as they tend to have a greater need for support structures and social networks in the academic environment.

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Appendix A: Table 1

Participant Number	Age	Degree Pursuing	Gender
Participant 1	30	undergrad	m
Participant 2	50	doctoral	m
Participant 3	19	undergrad	m
Participant 4	20	undergrad	f
Participant 5	20	undergrad	f
Participant 6	49	doctoral	m
Participant 7	48	doctoral	m
Participant 8	24	undergrad	m
Participant 9	36	doctoral	m
Participant 10	35	doctoral	f

Table 1. Participant Demographics Table.

Appendix B: Figure 1

Hybrid Data Analysis Process	
BRACKETING	1. Read and reread each transcript to ensure researcher has an overall understanding of content
	2. Extract each signficant statement from the transcript that relates to the phenomenon being investigated
	3. Formulate Meanings from these signficant statements
	4. Sort these meanings into categories or clusters of themes
	5. Construct the "how" of the experience from the themes
	6. Construct the "what" of the experience from the themes
	7. Synthesize Combine the 2 construct composites to create the shared experience of the phenomenon, take the synthesized findings and describe in-depth in the study.

Figure *1.* Data Analysis – Hybrid Data Analysis Process Figure.

Appendix C: Figure 2

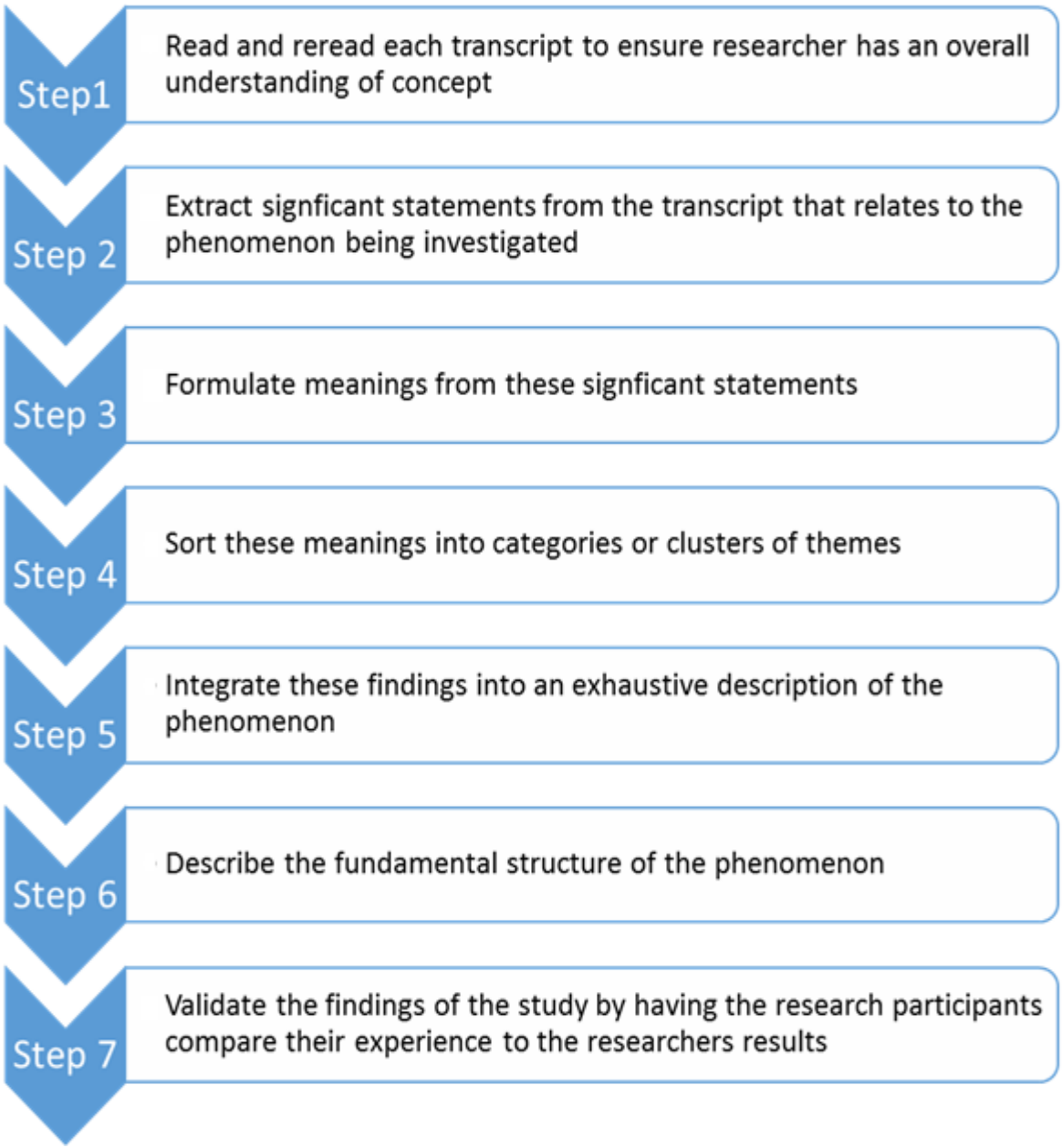

Figure 2. Adapted from Illustration of Colaizzi's (1978) phenomenological data analysis steps.

Appendix D: Figure 3

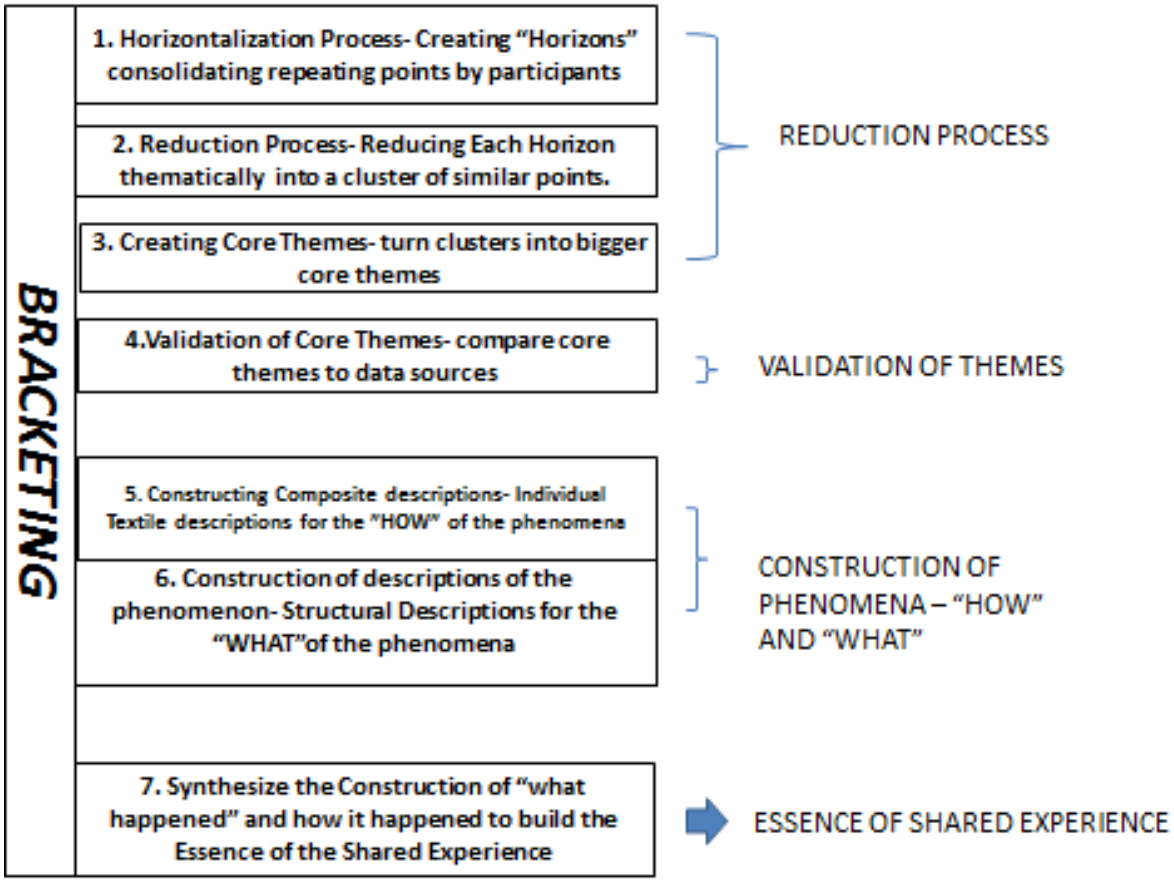

Figure 3. The steps of data analysis (adapted from Yuksel & Yildirim, 2015, p. 1).

Appendix E: Table 2

COMMON THEMES OF SIGNIFICANT STATEMENTS

What Experience Theme	How Experience Theme	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6	Participant 7	Participant 8	Participant 9	Participant 10	Totals
Communicating with Peers		**5**	**6**	**9**	**4**	**11**	**10**	**10**	**6**	**10**	**9**	**80**
	helpful	1	5	5			1	3	2	2	2	21
	helpful specific to a class				1	7	4	2	2		3	19
	convenient	2	1		1	1	1					6
	essential for communication with peers	2		1	1			2	2	2		10
	supporting peers					3		1	2	1	1	8
	keeping in touch			2		2		2	2		3	11
	can intensify demographic segragation						4					4
Sharing Information		**7**	**8**		**4**	**8**	**4**	**8**	**1**	**3**		**43**
	informational	3	3		1	2		2		1		12
	barely helpful	1										1
	advocates	1	2					2				5
	beneficial for school					6	2			1		9
	helpful	1	3		1	1	2	4	1	1		14
Peer Bonding		**2**	**2**		**5**		**1**	**4**	**1**	**5**	**5**	**25**
	perceived difficult initiation separated by demographics	1	1									2
	potential for bonding with veterans	1										1
	sense of belonging		1							1	2	4
	easier				1							1
	essential for peer bonding				1					1	2	4
	helpful				3			4	1	2	2	12
	connecting with other veterans				1					2		3
	essential for peer bonding, in private forums						1					1
Assistance		**2**	**2**	**1**	**3**	**3**	**3**	**6**		**2**	**3**	**25**
	helpful	1	2	1	1	3	3	6		2	3	22
	request is easier anonymously	1										1
	college life				2							2
	ability to use for assistance relieves stress										1	1
Recreation		**3**	**3**	**5**	**1**	**2**	**1**	**4**	**4**		**1**	**24**
	enjoyment	2	2	2					2			8
	stress relieving	1	2	4		2	1	4	3			17
Feedback		**1**	**2**			**1**	**3**	**2**				**9**
	helpful	1	2			1	3	2				9
Networking		**4**	**4**	**4**	**2**	**1**		**4**	**1**	**2**	**1**	**23**
	convenient	1	2									3
	potentially beneficial	2	2	2								6
	helpful	1			2	1		4		2	1	11
	helpful in finding similar peers				2				1			3

COMMON THEMES OF SIGNIFICANT STATEMENTS Continued												
Accessing Information about School				**6**		**8**	**3**	**1**	**2**	**2**	**1**	23
	convenient			1		2						3
	required			1					2		1	4
	essential for accessing school information			1		2				2		5
	perceived standard for tradional student			1								1
	beneficial					4		1		2		7
	useless						3				1	4
Communicating Veteran Specific Issues/Sites		**2**	**1**	**2**	**1**	**2**	**1**	**1**	**3**	**2**	**1**	**16**
	prefers face to face	1					1		3			5
	lack of awareness of social media capabilities	2		2	1						1	6
	researching help		1			1						2
	perceives potential for benefits			1		1		1				3
	access to vet specific relieves stress									2		2
Researching		**3**				**2**		**8**	**1**			14
	helpful	3				2		5	1			11
	great help							1				1
Usage		**2**	**1**		**1**	**2**	**2**		**3**	**1**	**1**	**13**
	perceived usefulness	1					1					2
	security concerns	1					1		2	1		5
	potential for great helpfulness	1			1	2						4
	distracting		1		1				1		1	4
	social media sites vary in usefulness				1							1
	social media is useful in private settings						6					6
	perceived negative stigma over unconstructive use									1		1
Communicating with Teachers		**2**	**1**		**2**	**1**	**1**	**4**	**1**			**12**
	convenient	2	1		1			2				6
	useful				1	1	1	2	1			6
	helpful							1				1
Communicating Face to Face		**1**	**1**	**1**	**3**			**1**				**7**
	occurs more natural when shared demographic background	1										1
	easier to communicate clearly		1	1	3			1				6

Table 2. Common Themes of Significant Statement.

Appendix F: Table 3

Themes Discovered in Student Veterans' Experiences with Social Media	
"What" was Experienced Themes	**"How" it was Experienced Themes**
1. Communication	**1. Helpful**
2. Information Sharing/Retrieval	**2. Peer Related**
3. Relationship Building	**3. Relaxing/Stress Relieving**
4. Collaboration	**4. Informational**
5. Recreation	
6. Usage	

Table 3. What and How Themes Table.

Course Design and Technology For Synchronous Interaction in an Online Course

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Abstract

Online course offerings in higher education continue to grow because of the strong demand. Though many online courses are based on an asynchronous model, there are courses that require real-time interaction between students themselves and between students and the instructor, which means synchronous interaction is necessary. The technology exists to support this mode of instruction but there are challenges to how to structure an online synchronous meeting. This paper presents the approach taken for an online business course about enterprise resource planning (ERP) and the techniques applied to help ensure successful student interaction and learning. The added challenge in this course was the use of a simulation that runs live during synchronous class meetings. From the outset the design of this synchronous online ERP course was based on the Quality Matters (QM) Program standards to help ensure the course structure was effective in guiding students through the course requirements and content. The article summary has some feedback from students and gives suggestions for improvements to future course offerings.

Keywords: Online Education, Synchronous Online Interaction, Quality Matters Rubric, Course Design, Enterprise Resource Planning, ERP.

1. INTRODUCTION

Online course offerings are common at most universities today. A quarter of students at post-secondary institutions enroll in online courses (The National Center for Education Statistics, 2012). Most of these online courses are taught in an asynchronous format. However, there are some online courses that use a synchronous component to facilitate interaction among students and between the instructor and students. Synchronous interaction in an online course has been shown to increase student success in terms of grade and satisfaction (Duncan, Kenworthy, & McNamara, 2012; Strang, 2012; McBrien & Jones, 2009). For some courses a synchronous component is not a design choice but

absolutely necessary. For example, if students must interact and coordinate actions during a simulation, then synchronous meetings are necessary.

The college of business at a university in the Southwest made a commitment to offering both undergraduate and graduate programs online though there were concerns that some courses might be difficult to teach online. For example, one course in the program uses a simulation that runs live during class and teams of students interact directly with the simulation during that time. The simulation is a core component of the course and is used several weeks during the semester. It would be necessary to design the online version of this course so that students would still work in teams and use the simulation. One of the instructors of the course agreed to develop an online offering to support the online degree programs.

From the beginning the teacher based the course design on the standards of the Quality Matters Program because prior experience had shown these standards provide a good framework for guiding students through the course material.

The Quality Matters (QM) Program is often recognized for its faculty-centered process for improvement of online courses (Loafman & Altman, 2014; Finley, 2012; Westerfelt, 2011; Shattuck, 2007). In 2003 the QM program began as a consortium of colleges in Maryland that received a FIPSE grant (Fund for the Improvement of Postsecondary Education) from the U.S. Department of Education to develop a program for the design of quality online courses. The QM Program is now a self-sustaining organization that provides faculty training and a formal course review process (https://www.qualitymatters.org/research-grants/fipse). Quality Matters has received national recognition for its peer-based approach and continuous improvement model using the Quality Matters Rubric.

The QM Rubric has eight standards: course overview and introduction (1), learning objectives (2), assessment and measurement (3), instructional materials (4), learner interaction and engagement (5), course technology (6), learner support (7), and accessibility (8) (MarylandOnline Inc.). The Quality Matters rubric provides a foundation that academic institutions can use for guidance in the course design process as well as a measurement for quality assurance of online courses. This rubric does not evaluate the instructor or the teaching of a given course. Instead, it is used to evaluate courses in regards to navigation, alignment of learning objectives to activities and assignments, assessment, and accessibility. The Quality Matters (QM) process is a "collegial, faculty-driven, research-based peer review process" (MarylandOnline, Inc.).

This paper describes the course design done for the synchronous class meeting as well as explanations and examples of the some of the Adobe Connect Meetings features which was used for the synchronous sessions (http://www.adobe.com/products/adobeconnect/meetings.html).

2. INFORMATION ABOUT THE COURSE

The course is taught by faculty in the department of accounting and information systems. It is one of three choices as part of the core requirements for all business majors. The course title is Enterprise Resource Planning. This course covers concepts in enterprise resource planning (ERP) and the information systems that enable integration of business processes. The main focus of this course is to learn how ERP systems integrate business processes across functional areas and support performance monitoring and decision making. This courses uses a complex simulation of manufacturing companies. The simulation is called ERPsim (https://erpsim.hec.ca). It runs in SAP, which is the industry leader in ERP software (http://go.sap.com/training-certification/university-alliances.html).

The traditional face-to-face course format already included extensive use of the learning management system at the university, which is Canvas (https://www.canvaslms.com). Assignments were delivered and submitted online. All the course material was available in Canvas, including a large number of videos created by the instructor about the course concepts, the simulation and the software used for data analyses (Tableau [http://www.tableau.com] and Microsoft Excel (https://products.office.com/en-us/home). This would not change for the online course.

Because attendance during "simulation" days is essential the course syllabus clearly explains that attendance is required on days when the simulation will run and there is a significant

penalty of half a letter grade for being absent on these days. A quiz at the beginning of the semester asks questions from the syllabus, especially about attendance. Appendix A has excerpts from the syllabus that explain the attendance policy.

Students work in teams throughout the semester. Teams are formed by the instructor before the first synchronous meeting by sorting the student names by major and sequentially assigning each student to a team. This serves to spread the majors across the teams.

3. ONLINE COURSE PREPARATION

Plan for Assistance

The instructor believed assistance is needed to manage the software environment during a meeting. The instructor requested five hours of time from two graduate assistants.

Set Meeting Schedule

The challenge to offering the course online is the use of a simulation that runs live while student teams monitor their business (sales, inventory and industry data) and make decisions that require completing transactions in SAP during the simulation run. In the traditional face-to-face setting sections of the course meet either two or three times a week. The instructor felt, however, that one weekly synchronous online session could work and might be easier for students to fit into their schedule.

A day and time needed to be chosen for the weekly meeting and was scheduled for one hour and fifteen minutes. For the first semester Friday at noon was chosen because the instructor thought students who were truly distance students might have some leeway in their work schedule to take an extended lunch on that day. Also, many regular courses on campus are offered twice a week, either Monday and Wednesday or Tuesday and Thursday. Far fewer classes meet on Friday so a schedule conflict would be less likely.

Alert Students

It was clear that students should know right away what the requirements for this particular online course are. To alert students the following steps were taken:

- *Registration*: A note about a required weekly synchronous meeting was added to the course description in the online registration system.
- *Syllabus*: The syllabus explained in detail the requirements for the course, which included an explanation of the required synchronous meeting and the concomitant technical requirements: a headset with microphone and a fast, reliable Internet connection (Adobe Connect has a program online that checks Internet speed). To help ensure students know the expectation of attendance and reduction in grades if absent, a syllabus quiz at the beginning of the semester covers these topics.
- *Direct communication*: Shortly after registration for the coming semester was done, the instructor emailed the registered students with an explanation of the course requirements. Another email was sent about a week prior to the start of the semester.

Promote Attendance

As in the face-to-face sections, attendance is absolutely required on days when the simulation runs and the same penalty applies. In addition, the instructor felt attendance for any weekly session was very important so the instructor thought about giving points for attendance. However, rather than giving points just for logging in the instructor settled on having something submitted by the teams at the end of every synchronous session.

A team submission at the end of each session served two purposes. First, a student received points (or not) attending and working with his/her team. Second, the short assignment gave the teams something to work together on each week and, hopefully, encouraged better communication and team interaction. In the first meeting of the semester, for example, the assignment was for teams to create a Word file that lists all the team members and gives a little information about each person, such as major, outside interests, etc. Teams are formed in the same manner as in the traditional class (spreading majors across teams) and students meet their teammates in the first synchronous session.

Apply Quality Matter Standards

The course design was based on the eight general standards of the Quality Matter Program (Crews & Wilkinson, 2014). The instructor relied heavily on support from the instructional consultants in the university's department of instructional innovation and quality. They provided important guidance in the course design and technical support for

Adobe Connect (AC) features the instructor had not used. At the instructor's request they also provided a training session for the instructor's teaching assistants.

After the course design was completed it was submitted for a formal review through the university's Online Course Improvement Program and it met the expectations of the Quality Matters review process.

Prepare Synchronous Meeting

Use breakout sessions. The synchronous class is conducted using Adobe Connect Meetings and breakout sessions are used for team activities. There is a breakout session for each team and the students in that breakout group interact privately with teammates. An example screen is shown in Figure 1 (taken from http://help.adobe.com/en_US/connect/8.0/using/WS372813bbb4178f2417094f9e12b308681ed-8000.html, 2016). Students in a breakout session can share computer screens and enable their mics for discussions. While teams are in their breakout groups, if someone has a question they can use the *raise hand* icon in AC which appears by the student's name and the instructor can join the group and talk with the team.

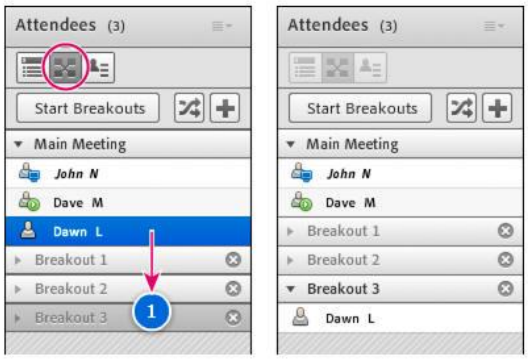

Figure 1 AC Breakout Session

The instructor used the *main meeting* area for general class instruction and interaction. For team activities, including the simulation run, breakout sessions were used.

Display an agenda. An agenda was displayed in AC for each meeting so students could see what would happen that day as soon as they logged on to AC. An example is depicted in Figure 2 and listed in Appendix B. At the beginning of a class the agenda was shown in the main meeting area and also in the teams' breakout session because there are times when students immediately began working in their teams when they logged in.

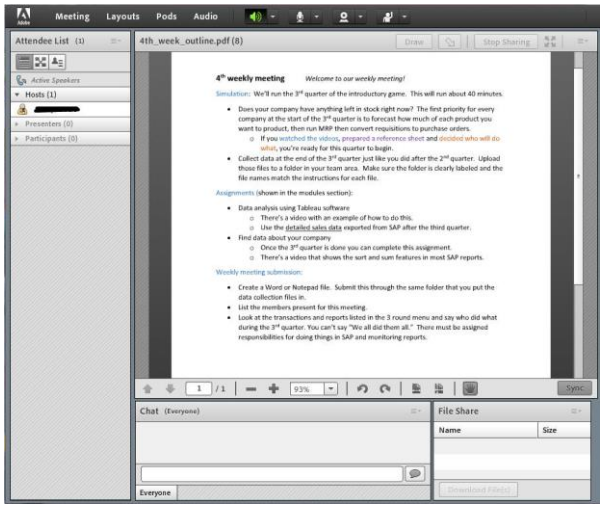

Figure 2 Example Weekly Agenda

Use a teaching assistant. The original plan was to have two teaching assistants attend each meeting. The assistants received AC training before the first class meeting. Their main role is to put students into their respective breakout sessions. Because people sometimes lose their connection to the AC meeting, when they rejoin the meeting they must be put back into their breakout group. Assistants can also answer some questions by participating within the chat pod during an AC session when the instructor is occupied.

From a technical perspective, here are a few other things about using AC in the weekly session:

- The instructor used the same AC session for all the weekly meetings and the link to this was readily available in the Canvas course.
- The instructor and teaching assistants started the AC session about 30 minutes prior to the official start time and kept the session going for about 30 minutes after the end because many teams continued to work together.
- A few sessions that were primarily instructional were recorded with AC's built-in recording utility and posted in the in Canvas.
- The use of a headset with microphone is necessary for all participants in a session because this eliminates echoes and other background noise. (This was clearly stated in the syllabus.)
- From the beginning students must learn to mute their own mic when someone else is

talking. Though the instructor can individually mute/unmute a participant's microphone there are many other things that require the attention of the instructor.

4. AC FOR STUDENTS

This course has numerous team activities. To be successful teams they must meet outside of regular class times. Students have the option of creating their own AC session from within Canvas. The instructions for how to do this were included in the course material listed in Canvas. Though many students in the online section could meet face-to-face there are some students who are truly at a distance but they can participate in a team's special AC session.

5. FEEDBACK FROM STUDENTS

In the fall of 2015 there were two sections of the ERP course—one was traditional and the other was the first offering online. Both sections were taught by the same instructor.

Table 1 shows the scores from student evaluations from both the online and traditional, face-to-face sections of the course. The ratings are from 0 (poor or strongly disagree) to 5 (excellent or strongly agree).

Item	Traditional (Mean Median) n = 28	Online (Mean Median) n = 29
Instructor communicated effectively.	3.8 4.0	4.2 5.0
Instructor's rapport with students.	3.9 4.0	4.1 4.0
Course is well organized.	4.1 4.0	4.1 4.0
The instructor has high standards in this class.	4.4 4.5	4.4 5.0
Overall this instructor was …	3.8 4.0	3.9 4.0
Overall this course was …	3.8 4.0	4.0 4.0

Table 1 Student Evaluations from Fall 2015

It was somewhat surprising to see how close the evaluations were for the two different formats, especially because the online course was offered for the first time. The instructor was pleased with how well the teams worked together in the online section after the first couple of synchronous meetings. They adapted quickly to the software and modes of communication. Overall student performance was similar for both formats. The average student score was 89% in the traditional section and 85% in the online section.

Below are a few comments from students in the online section.

Favorable:

- As much as I disliked the online meetings, they did help teach the subject and it was neat to be able to run the simulation and learn more. I ended up enjoying the meetings.
- Since we were an online course I thought it was helpful to have each agenda up before we met online. The online course material was very interactive and easy to follow along with all the course material.
- The class was fun and very well organized.

Not as favorable:

- Group work outside of the meetings is very difficult. I take online classes because I do not have time to go to classes throughout the week. So group projects and papers are very difficult.
- The class ran too long.
- Team assignments are hard to do. Allow enough time to complete assignments during the online class.

6. SUMMARY AND SUGGESTIONS

An online section of a course that required synchronous meetings was designed using the QM standards but, otherwise, had the same coverage of material. After the first semester student performance and evaluations were very similar for the traditional and online course sections.

Based on the instructor's experience teaching the online course with synchronous meetings, a few comments and suggestions for future course offerings are given here.

- For the students, give clear directions and links to the software that will be used for synchronous meetings, such as Adobe Connect.
- For the instructor and assistants, create a to-do list for the start of an AC session, such as "enable mics" or "start

recording." It is easy to forget things in the rush to get the class started.

- The first meeting can be difficult since everyone is working through technical issues and getting use to the synchronous environment. Don't plan to cover much content during this meeting. Spend the time acclimating students to the online synchronous tool being used, including practice going into breakout sessions and returning to the main meeting session (with microphones muted).
- One teaching assistant is probably sufficient but some assistance is important so the instructor can focus on the students and course material, not the software.

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Appendix A
Explanation of Attendance Policy
And Other Course Requirements

Excerpts from syllabus:

Taken the section named "Course Information and Course Delivery Method"

There is a required, synchronous online meeting each week.

- Attendance is required. There are points for attendance and participation and there is a penalty for being absent. (See the attendance section below.)
- You must connect using a **computer** because you will need to run software during some meetings. You must have a **fast Internet connection** and you must have **a headset with a microphone**. (Note: A headset with a **USB connector** has proven far more reliable than one with a one or two-prong connector. Plus, every computer has a USB connection but it varies between computers whether a one or two-prong connection is available.)
- You cannot attend this meeting via a hotspot or free Wi-Fi in a public setting. This simply isn't reliable enough. If you lose connection repeatedly during a meeting that will count has an absence.
- The online meeting will be through Adobe Connect. There are instructions about using Adobe Connect on the Resources for Course page.
- You have the option of coming to the main campus for this meeting. At the start of the semester I will post an announcement in Canvas about which computer classroom we will meet in. This is a good option if you want a reliable Internet connection but the student and teacher will still communicate through headsets.

Taken from the section named "Attendance."

There is a required synchronous, online meeting each week. There are points for attendance/participation and penalties for absences.

- There will be a 5% penalty of the overall course score if you are absent during the simulation runs (i.e. half a letter grade).
- Attendance is required during company presentations at the end of the semester. Presentations are made during an extended online meeting. There is a 10% penalty of the overall course points for being absent during the time your company's presentation is done.

Appendix B
Example Weekly Agenda Displayed in Adobe Connect

4th weekly meeting *Welcome to our weekly meeting!*

Simulation: We'll run the 3rd quarter of the introductory game. This will run about 40 minutes.

- Does your company have anything left in stock right now? The first priority for every company at the start of the 3rd quarter is to forecast how much of each product you want to produce then run MRP and convert requisitions to purchase orders.
  - If you watched the videos, prepared a reference sheet and decided who will do what, you're ready for this quarter to begin.
- Collect data at the end of the 3rd quarter just like you did after the 2nd quarter. Upload those files to a folder in your team area. Make sure the folder is clearly labeled and the file names match the instructions for each file.

Assignments (shown in the modules section):

- Data analysis using Tableau software
  - There's a video with an example of how to do this.
  - Use the detailed sales data exported from SAP after the third quarter.
- Find data about your company
  - Once the 3rd quarter is done you can complete this assignment.
  - There's a video that shows the sort and sum features in most SAP reports.

Weekly meeting submission:

- Create a Word or Notepad file. Submit this through the same folder that you put the data collection files in.
- List the members present for this meeting.
- Look at the transactions and reports listed in the 3 round menu and say who did what during the 3rd quarter. You can't say "We all did them all." There must be assigned responsibilities for doing things in SAP and for monitoring reports.

Empowering Students to Actively Learn Systems Analysis and Design: The Success of an Entrepreneurial-Inspired Project in a Hybrid Learning Environment

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Abstract

Systems Analysis and Design (SA&D) is the cornerstone course of a traditional information system curriculum. Conventionally, it is a sequence of two courses with the second course dedicated to the completion of a project. However, it has recently become more common to reduce the two-course sequence into one, especially for IS departments that are only concentrations of a business school and not independent departments. Not only has the original sequence been reduced to one course, but the course is also offered to non-technical business students. It is challenging to design a successful SA&D course that is subject to these constraints. In this article, the author showcases a modified SA&D hybrid course enriched by a real-life entrepreneurial-inspired project with a double review development process model. A survey conducted at the conclusion of the course shows that the new approach works well and holds great promise for improving future SA&D courses.

Keywords: Systems Analysis and Design, active learning, hybrid, entrepreneurship, double review process

1. INTRODUCTION

Many studies show that teaching Systems Analysis and Design (SA&D) has become increasingly difficult (Burns, 2011; Burns, 2012; Chen, 2006). For example, in the author's affiliated department, not only was information systems (IS) curriculum expanded to include business intelligence, data analytics, and project management, but the formerly two-course SA&D sequence was also reduced into a single course. The author was thus challenged to design a single project-based SA&D course that would not only cover both theoretical and conceptual topics, but also accommodate non-technical business students. The only prerequisite for the new SA&D course was an Introduction to Information Systems course.

To this end, a new structure was developed based on hybrid learning with the incorporation of a real-life project. Simply put, the traditional series of SA&D courses was implemented as one course: theoretical and concept-based materials were covered online while face-to-face sessions concentrated on the project. The entrepreneurial-inspired project created by the author was structured to follow the online materials. In addition, the author acted as a mentor, investor, and technical advisor to the project teams. When the 16-week course ended, a survey was conducted, and judging from student performance, assessments, and survey comments, it became clear that the entrepreneurial-inspired project was pivotal to the entire course, and greatly excited and motivated students. Overall, results to the new approach are very encouraging and show definite promise. In this paper, the author shares his experiences so other instructors may consider using a similar approach.

The paper is organized as follows: Section 2 elaborates the current challenges SA&D instructors face. A detailed review of the hybrid learning model is given in Section 3. Section 4 discusses the importance of real-world projects in learning SA&D. The modified course structure is elaborated in Section 5. The survey results are summarized and discussed in Section 6. Final remarks are given in Section 7.

2. THE CHALLENGE

Several trends have had a drastic impact on teaching SA&D. First of all, IS departments have been opening SA&D classes to non-technical business majors. They argue that the magnitude of money spent on developing business information systems needs close monitoring. According to one study, companies on average spend up to 5% of their total revenue on systems development and maintenance (Carmen & Tija, 2005). IT has become an enabling technology for functional business units, and managers should have at least a minimal understanding of technologies in order to develop internal scorecards for assessing performance and to source strategies to minimize costs. Therefore, managers must have a basic understanding of the system development process to fully utilize the enormous amounts spent on development and maintenance. If managers are involved in the process of system designs and operations, they will be in the position to develop other business initiatives such as business process re-engineering and social media analytics. A strong and effective relationship between functional business units is a determinant of success in gaining business advantage through IT (Keen 1999; Reich and Benbasat 2000). Mature and system development-savvy managers can be assets during the development process. The 21st century business model is very different from before: market volatility is high because consumer tastes change quickly and the real-time global economy brings competition from around the world. Consequently, both product development and system development cycles have been dramatically shortened. When managers see opportunities to respond to market changes, new systems and applications must be developed quickly in order to seize these opportunities. Technical teams need to work closely with business units and improve communication and encourage the exchange of ideas. It makes sense to train business people in systems analysis and design.

Another trend is the change of SA&D curriculum. Typically, SA&D is a sequence of two undergraduate courses: a theoretical and conceptual introduction to SA&D, followed by a project course. Some schools offer only one course in SA&D but require a capstone project class, essentially following the same two-course model. However, Burns (2011) found that the one course, one semester delivery approach becomes much more common than the two class approach.

Within the author's affiliated college, the two-course undergraduate SA&D sequence has been reduced to simply one course with no capstone project class. SA&D is also being offered as an elective to other business students while still being required for both IS major and minor students. The only prerequisite for SA&D is a general course on IS theories and practices.

Consequently, the author has had to restructure the SA&D sequence into a single course that serves the dual purpose of accommodating business students while also furthering the development of students wanting to pursue careers as systems analysts.

3. HYBRID LEARNING

The main dilemma in having a single course replace a traditional two-course series is that the course now requires a different delivery modality. To accomplish these goals, the author adopted a hybrid modality; a mix of traditional face-to-face and online learning modes. Hybrid learning has been praised as having the best of both worlds. It is also adopted in teaching SA&D. For instance, Bain shows that a hybrid course delivery can produce similar if not better results than traditional delivery methods (Bain, 2012). Tanner and Scott report how a flipped classroom approach actually helps to teach SA&D (Tanner and Scott, 2015). In the flipped classroom approach, students are expected to learn theoretical concepts outside of the classroom setting (e.g. online), and are given the opportunity to apply these concepts in a face-to-face class with the instructor and other students. Griffiths et al. report the success of a lecture-free approach in a hybrid graduate course on SA&D with learning materials and design tools online supplemented by a weekly, one-hour lab-based practical session (Griffiths, et al., 2003).

These studies show a certain degree of success in using a hybrid delivery to teach SA&D, but do not offer any frameworks. A detailed literature review on variations of the hybrid delivery model is given by (Dana 2007). The models being reviewed identify the components and their roles and relationships to each other in the hybrid setting.

For example, Kerres and De Witt (2003) suggest a basic hybrid model combining online and face-to-face meetings based on their 3C model: content, communication, and construction. Kitchenham (2005) identifies three major components of successful hybrid courses: collaboration, strong infrastructure, and student demand. Schatzberg (2002) reports how Bloom and Kolb's experimental learning could potentially be used to teach systems analysis and design. Barnum and Paarmann (2002) identify four components of a hybrid model: web-based delivery, face-to-face processing, creation of deliverables, and collaborative extension of learning. The first component refers to a typical online learning module where students can access necessary learning materials, discussion forums, message exchanges, etc. face-to-face meetings help students have a more comprehensive understanding of materials. Having conceptual knowledge is not enough; through the creation of a "tangible" deliverable, students undergo the process of constructing knowledge and demonstrating their understanding. A collaborative extension of learning encourages students to share their learning experiences, information, and resources in their own ways, whether they be online or offline.

4. IMPORTANCE OF PROJECT TO SA&D

Many of us may have taken it for granted that projects are vital to learning SA&D. The author agrees with Burns that IS is an applied science similar to medicine and engineering (Burns, 2011). SA&D is fundamentally an engineering discipline, where engineering principles are applied by developing information systems to solve business problems.

There are many studies that attest to the benefits of having an SA&D curriculum build towards a project. Chen (2006) argues that a real-world project is better than a simulated project. Helwig (2006) also suggests using a real system development project to enrich SA&D coursework.

There are many ways to incorporate real-world projects to enrich SA&D curriculum. Some instructors might instruct groups to work on different client systems. Logistically, it is difficult for each team to work on a separate client; in this case, students must deliver professional results otherwise it will be difficult to attract other companies for future collaboration. In order to be successful, the project has to leverage on the instructor: the instructor has to mediate and participate in meetings between clients and students. Another method would be to bring in one client project and have each student group work on the project and compete with each other, as Helwig suggests (2006). Harris (2009) also argues that a competitive project method would benefit students more than a stand-alone project.

5. THE MODIFIED COURSE STRUCTURE

After reviewing previous studies on teaching SA&D as discussed above, the Barnum and Paarmann (2002) hybrid model was adopted. The course lasted for 16 weeks, and learning materials were accessible online on Blackboard, including lecture notes, videos produced by the author and from other learning sources, discussion forums, individual chapter assignments, and chapter quizzes. The online portion was essentially identical to a full online SA&D course with both asynchronous learning and interactivities. However, a weekly 1.5 hour face-to-face meeting was mandatory. Since the project was the backbone of the course that required students to create tangible deliverables, students had to collaborate both online and offline. In the face-to-face meetings, the author spent time addressing technical and management issues. The class was given a single project, creating a natural competitive environment among teams. For each deliverable, the author randomly selected the work of one team and walked through the document in class, offering comments and critiques and inviting the class to be actively involved in the open review process.

Class teamwork has inherent management problems; major disputes such as non-performing team members and disagreements among team members regarding concepts and directions were handled separately by appointment or during office hours with the author. Team restructuring did occur during the first phase of the project.

In order to accommodate non-technical business students, the breadth of topics and depth of coverage needed to be changed. The IS 2010 curriculum has been published for many years (Topi, et al, 2010). The new curriculum suggests seven core courses, including a course on Systems Analysis and Design (IS 2010.6). The Task Force also suggests a list of topics to be covered in the SA&D course. A graphical comparison between the topics in IS 2010.6 and the selected textbook by Shelly (Shelly and Rosenblatt, 2010) is illustrated in Appendix 2. The IS 2010.6 curriculum guideline has replaced the technical skills of functional and object-oriented design approaches with business process management. These missing topics closely mirror the actual coding of the system. Wong shows that

students without programming exposure suffer and underperform in learning SA&D if the course's coverage was too technically oriented, for example, by focusing on functional or object-oriented approaches and their skills (Wong, 2015). On the other hand, business process management is not programming-driven, and is capable of capturing business behavior and logic without any technical programming training. Students without programming backgrounds can definitely benefit from it. Conceivably, the new curriculum can accommodate non-technical business students wanting to understand how systems are developed. In this aspect, the new guideline actually fits the current requirements well. However, most SA&D textbooks, including Shelley's, do not cover business process modeling (BPM) in detail. To supplement the text, the author created a complete module with lecture notes, readings, and videos on BPM, including advanced concepts such as business process re-engineering (BPR) and activity-based costing (ABC). In fact, the BPM module also included extensive discussion on the patentability of business processes, and several exemplary patents, including Amazon's 1-click checkout process, were discussed. The inclusion of relevant, popular examples made the students more enthusiastic and willing to join discussions.

Another significant supplement to Shelley's textbook included an emphasis on writing functional and non-functional software specs based on the clausal form, the use case analysis that starts with the use case diagram, and detailed use case descriptions using a standard industrial template.

In addition to the team project and online materials, students had individual homework assignments such as creating Gantt charts for scheduling, and computing NPV and ROI to determine project feasibility. Students were exposed to a variety of subject areas, and were assessed through chapter quizzes and a final exam.

5.1 The Project

As we have seen from prior studies, the project is an integral part of learning SA&D. It is preferable to have a competitive project rather than multiple standalone projects. However, projects taken from textbooks are not effective; for one thing, most textbooks have "solutions" posted online, and students can easily complete projects simply by searching for answers. Since the course was also being offered to non-technical business students, the project was designed to only complete the analysis and design phases without going to implementation.

To entice students, the author used a new strategy: instead of bringing in a client's project to the classroom, the author created a "startup" company that would offer a mobile grocery shopping App called "**B4U"** based on an online-to-offline (O2O) model similar to Uber. A high-level business narrative was given and explained to students in the first face-to-face meeting (see Appendix 3). Students were grouped into teams of 3 to 4 people to form their own startup. As seen in the narrative, they needed to fill in many gaps, for instance, the business model, the payment methods and alternatives, etc. Based on student feedback, the first face-to-face meeting was very inspirational and motivated them to be entrepreneurial. They brainstormed the features and processes of the App with each other, and interviewed dorm-mates, friends, and family members for additional requirements. They were motivated because they believed the project was real and attainable. The author considers the project to be entrepreneurial even though it took place in a classroom setting, because students were encouraged to go beyond the course requirements and approach it as a serious startup project. Several student groups did go beyond the course requirements. They created business plans and funding proposals with assistance and guidance provided by the author outside of class. The author observed that the teams radiated a team spirit similar to that in a fast-paced, high-energy startup.

There were three other considerations in deciding the focus of the project. Firstly, as a practitioner and SA&D educator, the author values the importance of system requirements. There is significant evidence demonstrating that requirements and the management of requirement changes can make or break a project. Both practitioners and educators commonly agree on this belief. Misic and Russo (1999) report the differences between topics prioritized by SA&D practitioners and educators. Both sides agree that defining requirements and the scope of project are the top two tasks that should be taught to SA&D students.

Secondly, a requirements document is essentially a contract between the development team and the system procurer. The author treated the documentation as a writing-intensive exercise similar to the one proposed by (Pomykalski 2006). The difference is that Pomykalski used case studies for students to practice on, but the author used a complete project requirements document

that was written, reviewed, revised incrementally and iteratively.

Thirdly, the author incorporated industry best practices into the project by practicing incremental and iterative development and a rigorous double review process. A major concept in system development such as validation and verification (V&V) may be too abstract for students. The question in system validation: "Are we developing the right system?" can only be answered by the review process. For instance, in developing their software functional specs, one team misunderstood the nature of the project (perhaps they were influenced by examples of grocery shopping Apps found online). However, their review team realized the specs were not an O2O model but a conventional B2C model between grocery markets to consumers. The error was caught early in the development cycle and was corrected before moving forward.

The double review process was conducted as follows: during face-to-face meetings, the author randomly selected a work-in-process deliverable from a team. The author pointed out deficiencies or errors in this document and explained to students how to review and critique the deliverables themselves. The author acted as a mentor, coaching them through their mistakes. Since they were working on the same project, this type of hands-on mentoring and open review bridged the gap between learning concepts and actually applying them.

The deliverable was then assigned to another team to review (the assigned review teams remained the same throughout the project, and project teams were also encouraged to interact with their reviewers.) Once the student reviews were finished, the author reviewed the original deliverable in addition to the comments of the review team.
To enforce the rigor of the review process, two separate scores were given for each deliverable, one to the team that created the deliverable, and one to the review team. After the original team received comments from both their review team and the author, they had to revise the document.

Because deliverables were out of sync with each phase, students truly understood firsthand why the waterfall process model wouldn't work and why incremental and iterative processes were desirable. The review process also focused on consistency and coherency from deliverable to deliverable.

Face-to-face meetings primarily focused on the project and its relationship to textbook concepts, but they also helped clarify problems that students had with the online learning materials. Furthermore, the author was able to demonstrate how to use software tools in class.

The project also became a training ground for students wanting to become project managers. Students were explicitly encouraged to rotate the role of project manager for each deliverable. Project managers had a chance to practice their skills on scheduling, team management (personality conflicts, non-performance, etc.) There was a peer evaluation for each deliverable, and members would evaluate each other on their contributions to the deliverable. At the end of the semester, a blind peer evaluation was conducted, and evaluations had a direct impact on grades.

Students were given a document template that had the following mandatory sections. They could add or expand from the template.

Section 1. Executive Summary	Section 6. Use Case Diagram
Section 2. Business Case and SWOT Analysis	Section 7. Use Case Descriptions
Section 3. High Level Requirements	Section 8. Data Model
Section 4. System Functional Specifications	Section 9. Future Provision
Section 5. Constraints and Non-Functional Specifications	Section 10. References

The first sections form the base of the business plan, in which teams presented their ideas as the startup company offering the B4U app. They needed to create a business case and a SWOT analysis to support the reason for the startup. The author was impressed by several teams that actually created competitive analyses along with three-year cash flow analyses to justify the investments.

Sections 3 through 10 comprise the requirements document that focused on conveying the business requirements to the development team. Both high-level and system functional specs were written in clausal form for precision. In the Use Case Descriptions section, a use case description table template was given to students. For each use case description, a set of user interface screens or reports would follow if the use case needed to interface with people. It was then followed by a business process model capturing the business logic and control flow of the use case. Section 7 forms the bulk of the entire document.

The Phase 1 deliverable was the write-up of sections 1 to 5. Phase 2's deliverable focused on sections 6 to 7, plus the revision of the previous sections based on the double reviews. However, only the use case description tables were required without the UIs and the business process model at this point. Phase 3's deliverable was essentially a revised Phase 2 deliverable with UIs. The Phase 4 deliverable was the revised Phase 3 product with the addition of the business process model implemented in a multifunctional flowchart. Unfortunately, the double review cycle was time consuming, and did not give the class sufficient time to complete the data model for the project.

Note that for each review cycle, the entire document was reviewed for consistency and coherence. A detail evaluation form was given for each deliverable review. When the review was returned, both the team and reviewers would see the comments. The double reviews also helped the reviewers; they would know if their comments were correct and appropriate and whether they had missed out on other issues, and so on.

Students used mostly Microsoft tools, such as Visio to draw the UML use case diagram and the multifunctional flowchart for the business process model, Powerpoint's Storyboarding add-on for user interface design, and MS Project to create the Gantt scheduling diagram. There were both text-based and video-based tutorials on using these software tools in the online modules. The author also demonstrated them in the face-to-face meetings, mostly focusing on the project itself as the example.

6. THE SURVEY RESULTS AND DISCUSSION

The course was offered in two sessions with a total of 47 students. With 3-4 students per team, there were 15 teams in total. Students filled out a survey at the end of the course, and the results are summarized and discussed in this section.

6.1 Student Profiles

The student profile is tabulated in Table 1 in Appendix 1. Among the 47 students, 64% (30) were seniors and 64% (30) claimed either they had taken programming classes or learned programming on their own. 70% of them took the class because it was a requirement for their major or minor. The other 30% took the course because it was listed as an elective, or they had personal interest in learning SA&D.

Only 51% considered themselves as IT-savvy even though 64% claimed they had programming experience. (Note that the percentage henceforth is the sum of the Agree and Strongly Agree percentage of responses unless stated otherwise.)

Prior to taking this course, 57% of students thought application development was simply writing code. This furthers the argument that SA&D should be offered to non-technical business students so they can learn and appreciate the complexity of system development.

40% of students believed that the class gave them more confidence to pursue a career in SA&D, while 34% were indifferent. These indifferent students may not have considered pursuing careers as system analysts anyway. 85% of the students believed that the class did help them understand SA&D and only 26% of them thought learning SA&D was difficult. Overall, the new approach worked well.

While project-related work accounted for 52% of the weighted total, the remaining 48% consisted of individual homework assignments, chapter quizzes, and the final exam. To determine any difference in performance between students with programming experience and those without, two independent t-tests were conducted. The first t-test was based on students' weighted totals that included group project scores of deliverables for each phase (including review reports), as well as individual scores for assignments, chapter quizzes, and the final exam. The second t-test was based solely on the weighted total of students' individual work, including four homework assignments, nine chapter quizzes, and one final exam. The results are shown in Table 2, Appendix 1. As seen in t-test 1, the mean scores of the weighted total between students with programming and without are 80.70 and 79.08, respectively, and the difference is not significant. In the second t-test, the mean scores of students' individual work are 20.83 and 19.80. Again, the difference between them is not significant. Wong reports that, in SA&D classes covering technical topics such as dataflow diagram, etc., students with prior programming experience perform significantly better than those without (Wong, 2015). The current study is based on the IS 2010.6 guideline that eliminates both functional and object-oriented approaches. Instead, the guideline suggests adding business process modeling that does not require much prior programming exposure. The t-tests in this study confirm that the performance gap no longer exists.

6.2 Course Delivery Modality

Students were also asked about their opinions on the course delivery modality. Responses are

summarized in Table 3 in Appendix 1. 68% of students preferred the hybrid format to online classes. Only 40% of them preferred a hybrid format to face-to-face classes, while 26% of them were indifferent. Unexpectedly, only 28% of them thought it would be a good idea to split the class into two courses. It could be because 57% claimed they learned the online materials effectively and only 30% of them thought they needed more face time. During the course, a lingering question for the author was whether the online material workload was too overwhelming, since almost two courses were combined into one. However, 60% of the students said the workload was about right; 28% thought the materials were excessive, while 13% of them demanded even more material. Generally speaking, the hybrid modality was well-received.

6.3 The Project

The project was the main component of the entire course, and the author was anxious to find out what the students thought about the project and the double review process. The survey questions regarding the project are summarized in Table 4 in Appendix 1. The responses are listed in the descending order. Surprisingly, a majority (83%) of students agreed that working as reviewers helped them not only on their project but also in understanding SA&D. 81% of them also agreed that the project helped them practice project management. 79% of them thought that the project was realistic and relevant, with 21% being indifferent and with no one disagreeing that the project was realistic and relevant. This is a significant affirmation of the project's effort. Similarly, 79% agreed the project helped them understand the online learning materials. This is again a significant confirmation of structuring project progress in parallel with the online learning materials. 70% of students agreed that they had positive team experiences, and 70% of them even claimed they would hire their team members in the future. 64% of them believed their team members were technically competent. 64% agreed that reviewer feedback was helpful and only 28% of them thought their reviewers were not qualified to review their document. Interestingly enough, 68% of them admitted to spending more time on the project than studying online materials.

The results affirm the idea that a realistic, and in this case, entrepreneurial, project can highly motivate students. Working on the project did enrich their active learning of SA&D concepts.

6.4 Topics and Other Issues

The next set of questions in the survey was designed to elicit responses from students regarding topics covered in this course, and other issues and concerns they might have.

The author had considered an alternative approach in that perhaps the project could have begun by designing the user interface first. Students were asked in the survey if they agreed that designing the UI first would help them in doing the project. It turns out 49% agreed, while 32% were indifferent. However, in working with students closely, the author noticed that visualizing the end product definitely helped them connect the dots.

When students were asked if they found the software tools difficult to use, only 17% of them said the tools were difficult.

Students were also asked what topics were confusing and difficult, and which topics they would like to see covered more deeply. The responses are summarized in Table 5 in Appendix 1. The rankings for confusing and difficult topics are almost identical. The author was surprised to see that software specs were the top concern. It might have been confusing and difficult to students because they needed to discover, collect, validate, and organize the requirements, and they might be unfamiliar with the technical writing style of the specs in clausal form.

It is interesting to see that 36% of them wanted to learn more about project management. This suggests that the efforts they made while producing this complex assignment showed them the importance of project management.

7. CONCLUDING REMARKS

The new SA&D curriculum, the entrepreneurial project, and the Barnum and Paarmann hybrid model seem to be successful. Another indication of success is that many students chose to include the project document in their job interview portfolios. One may argue that the heavily-documented approach taken in this class does not truly reflect the preferred agile development process typically adopted in startups. However, the author believes that once the students experience such a heavily-documented process, it will be easier for them to transition to an agile process.

There are several takeaways from this report. Firstly, the online module is very similar to other SA&D online programs; the important differentiator is the startup-based project chosen for this course. It instilled a sense of authenticity in the work and fostered open competition among

the teams; in fact, at the end of the course a few teams were working on a full business proposal to raise funds. Secondly, the double review process is vital. As indicated in the survey results, students really appreciated this process, particularly the opportunity to be reviewers themselves.

There are several concerns and issues with the new structure. The downside of this approach is the sustainability of finding interesting projects to motivate students. In the Internet age, it is almost mandatory not to re-use previous projects taken from textbooks, because a simple search will easily reveal the answers. Another weakness is the double review process; while it is extremely useful, it is also time consuming. The review cycle for each deliverable took roughly two weeks to complete, and the class did not finish the data modeling portion of the project because they ran out of time. The author plans to improve this process by using Google Docs instead of printing out documents for review.

Finally, SA&D is, in fact, an applied discipline, and the hands-on mentoring approach helps students see the relevance of learning materials and teaches them how to solve real-world problems. However, it is heavily dependent on the instructor's capability. As shown in (Burns 2012), the industry experience of an instructor does affect the purpose and content of the SA&D course. Clinebell and Clinebell report the centuries-old contention between academic rigor and the relevancy of real-world education (Clinebell and Clinebell 2008). Simply put, the current structure may not be appropriate if an instructor does not have the necessary industry experience.

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Appendix 1
Survey Results

Status	Has Prog	No Prog	Total	
Junior	12	5	17	36%
Senior	18	12	30	64%
Total	30	17	47	
	64%	36%		

What was the reason for taking the class?	Has Prog	No Prog	Total	
Required course for Major	11	6	17	
Required course for Minor	13	3	16	70%
Elective course for Major	1	6	7	
Interested in exploring SA&D	5	2	7	30%
Total	30	17	47	

Consider self as IT savvy	51%
Simply writing code	57%
Class helps understanding of SA&D	85%

t-test 1 on weighted total of team project scores and individual assignment and test scores		
	Mean	SD
No Programming	79.08	8.60
Has Programming	80.70	12.24
t = -.48, df = 45, p = .63		

t-test 2 on weighted total of individual assignment and test scores only		
	Mean	SD
No Programming	19.80	3.00
Has Programming	20.83	3.16
	t = -1.05, df = 45, p = .30	

Table 2 – Independent Group t-test Results

Prefer hybrid to online classes	68%
Prefer hybrid to face-to-face classes	40%
The class should be split into two classes	28%
Can learn effectively and efficiently online	57%
More face time will be better	30%

The workload of the online materials is:	Has Prog	No Prog	Total		
Too much	4	1	5	11%	
More than other hybrid classes	3	5	8	17%	28%
About right	19	9	28	60%	60%
Need more materials	3	1	4	9%	
Definitely need more materials	1	1	2	4%	13%

Working as a reviewer improved their understanding	83%
Project helped them understand project management	81%
Project was realistic and relevant	79%
Project helped them understand online learning materials	79%
Positive team experience	70%
Would hire team members in the future	70%
Spent more time on project than online learning materials	68%
Reviewer feedback was very helpful	64%
Team members were technically competent	64%
Reviewers were not qualified to review	28%

Table 4: Project and Related Issue Responses

Confusing Topics	Total	
Software Specs	11	23%
UC Descriptions	10	21%
BPM	9	19%
ERD	8	17%
UC Diagram	7	15%
UI	2	4%

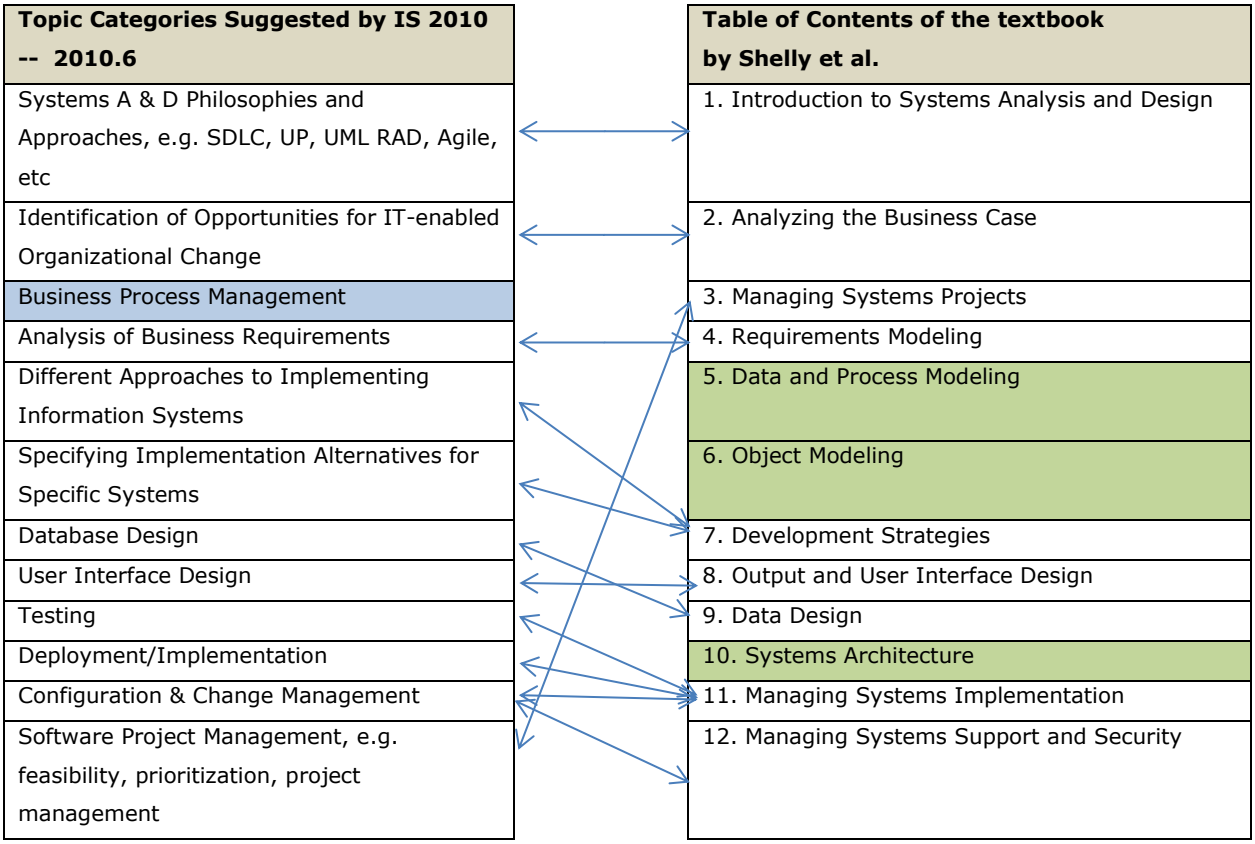
Difficult Topics	Total	
Software Specs	12	26%
UC Descriptions	10	21%
BPM	9	19%
UC Diagram	7	15%
ERD	5	11%
UI	4	9%

Want to Know More	Total	
Project Management	17	36%
ERD	10	21%
Software Specs	8	17%
BPM	8	17%
UI	4	9%

Table 5: Topic Issues

Appendix 2

Comparison of the topics proposed by the IS 2010 curriculum guideline with the traditional Systems Analysis and Design exemplified by the textbook of Shelly and Rosenblatt (2010).



The new guideline replaces technical skills of the functional and object-oriented approaches with business process management.

Appendix 3
Project Narrative
Buy For You (B4U)

Synopsis

There are many reasons why shopping for groceries is a real chore for many people. Whenever there is a need, there will be companies started up to meet market demand. Grocery delivery services crashed and burned in the 2000 dotcom bust. Consider the failure and, eventually, the resurrection of WebVan in this article: http://techcrunch.com/2013/09/27/why-webvan-failed-and-how-home-delivery-2-0-is-addressing-the-problems/

Major players have also been jumping on the bandwagon in recent years. Read the following article to get some general ideas:

http://www.laweekly.com/restaurants/12-great-la-grocery-delivery-services-for-when-youre-too-busy-or-lazy-to-shop-4895408

As you can see, there are several "big guns" in this space:

- AmazonFresh

  http://www.cnet.com/news/amazonfresh-vs-supermarket-a-hands-on-shopping-test/
- Google Express

  https://support.google.com/shoppingexpress/answer/6315260?hl=en
- Albertsons/Safeway/Vons

  http://shop.safeway.com/ecom/shop-by-aisle

Online-to-Offline (O2O) Model

Grocery delivery companies such as AmazonFresh and Google Express offer the traditional B2C model: they handle ordering, fulfillment, and sometimes even hold inventory. The so-called O2O model is very different from B2B and B2C business models. O2O models are inspired by C2C (customer-to-customer) models like the early Etsy model (etsy.com) where individual subscribers can be producers/service providers to other subscribers. Another C2C success is elance.com (acquired and changed to Upwork (upwork.com)). Subscribers offer online services such as programming, translation, graphic design, marketing services, etc. However, many services we need are ***offline* services** that cannot be done online. In an O2O model, an online platform provides matching, directory services, validation, verification, guarantees, and other management functions to the subscribers. Offline services are provided by subscriber to subscriber. The notable O2O businesses that are disruptive are Uber and AirBnB. Read this article to learn more on O2O: http://techcrunch.com/2010/08/07/why-online2offline-commerce-is-a-trillion-dollar-opportunity/.

We see there is a niche market for an O2O grocery shopping platform that can compete with the big B2C companies such as AmazonFresh and Google Express. The team project goal is to analyze and design an O2O mobile App for grocery shopping.

Statement of Work (SOW)

1. Background

Most grocery delivery companies are B2C or a combination of B2B2C. For example, when a customer orders groceries from Google Express, the order will be sent to Google Express's fulfillment centers where a Google Express staff member is assigned to go buy the items from grocery stores and deliver them to the customer for a fee. These companies focus on relatively affluent communities in metropolitan cities. However, it is still questionable whether or not this is a sustainable business.

To people like students and those without cars, grocery shopping is indeed a headache, especially in Southern California. If you are a student staying on campus or in an off-campus apartment, how often do you ask friends to buy you groceries when they are shopping for themselves? Imagine a single mom with 2 kids at home without a car, how often will her neighbors and relatives offer to get groceries for her? There are many other potential customers, including senior citizens who live at home on their own, people with disabilities, and so on.

We are going to change their situations and improve their quality of life. We will develop a system that uses a mobile App as frontend and a cloud backend to support an O2O model for grocery shopping.

2. Objectives

The objective of this project is to create a Buy for You (B4U) platform that offers an O2O business for grocery shopping. On one hand, it helps alleviate the hardship and headache of those who need an inexpensive solution to shop for groceries. On the other hand, a person who offers shopping services can monetize his shopping activities. The marginal time spent on buying extra items for others while shopping for their own is minimal. For people who want to earn extra income, the service fee could be a good subsidy to their grocery bills.

B4U is very different from WebVan, Google Express and Amazon Fresh. B4U offers only a platform and does not provide fulfillment services. As such, B4U is very scalable.

3. Scope

The project will focus on collecting and analyzing requirements, defining the process (business logic) behind the scenes, designing the user interface (UI), and the data model that supports B4U. The entire project will take approximately 12 weeks until the end of the semester, with teams of 3-4 students acting as analysts and designers. The project manager role should be rotated.

4. High Level Requirements

The high level requirements in this section, e.g. features of the App, are not exhaustive and meant to give you a head start for the project. You need to discover more requirements with your team.

First of all, there are several major "actors" (we try not to use word "users" because it can mean many things). A B4U Subscriber is the end user of B4U. If a Subscriber makes shopping requests, he becomes a Requester. If a Subscriber offers shopping services, he is a Buyer. The followings are two example scenarios:

Scenario 1: Requester makes Shopping Requests, such as "Need grocery from Trader Joe's @ University." The request is broadcast to the subscribers in the vicinity defined in the Requester's profile. If another subscriber can provide the service, he acts as a Buyer. Then the Buyer will respond to the Requester to find out the details.

Scenario 2: Buyer offers a shopping service and posts a Procurement Request, such as "Will be shopping at Albertsons @ Campus in 10 mins"; "Will go to Whole Foods @ PCH tomorrow 2/5." The posting will be broadcast to the relevant subscribers. If a subscriber does need milk from Albertsons, he becomes a Requester. The Requester will respond to Buyer for the details.

The preliminary list of high level requirements is as follows:

1. A B4U Subscriber needs to download and install the B4U App either from Google Play or Apple's App Store.
2. A B4U Subscriber needs to register with B4U and create a profile.
3. A Subscriber can be a Requester, or a Buyer, or both.
4. A Requester can post a Shopping Request.
5. A Buyer can post a Procurement Request.
6. Buyers and Requesters can update or cancel their requests as long as they are still open.
7. A Subscriber can post their evaluation of other Subscribers based on their experience.
8. Requesters and Buyers will have their rating along with online comments by subscribers.
9. Online comments can be text, image, audio, or video.
10. A Shopping Request can have items from one or more merchants who participate in B4U by offering online product catalogs.
11. A Shopping Request can specify the time when the items are needed.
12. A Shopping Request can be delivered to other addresses (within the service area of the Buyer).
13. A Shopping Request can be a repeated request which will be posted automatically.
14. A Buyer or a Requestor can specify which store to shop at.
15. A Requester can browse product catalogs to generate shopping lists.
16. Items on the shopping list show the pictures, quantity, unit price, aisle/shelf location (if available) and merchant's name and location.
17. A Procurement Request specifies where to shop, the time and date, and the approximate completion time.
18. While the Buyer is shopping, he can text or chat with the Requestor to amend the shopping list, e.g. out of stock, etc.

5. What to Do

1. Do an extensive search on existing grocery shopping services and identify their features. This will be your background research for the document.
2. Discover new actors, define their roles in B4U.
3. As described in the requirements analysis chapter, you are supposed to interview the end users and other stakeholders to identify their needs. Talk to your friends and family and ask them what they would like to see in B4U. Bring your findings to your team meeting and consolidate them.
4. Using the OSAS-StudentSample.pdf in the Project folder as a reference, your team will create a document that contains the following:

   (A) Use the Intra-group evaluation as the first page (the template is in the Project folder).

   (B) The cover page with project title, your team number, member names, date, etc.

   (C) Table of Contents

   (D) Write up sections similar to Sections 1 to 5 of the OSAS-StudentSample.pdf.

   Section 1 will be an Introduction, or an Executive Summary. You need to highlight the opportunity and why B4U works. You can decide to make it either a non-profit or a for-profit business. In either case, you will need to have a sustainable business model.

   In Section 2, you outline and defend the investment of developing B4U with a business case. Very likely you will argue your business case with a framework such as the SWOT analysis. You can have many ways other than SWOT to support your business case. If you can identify financial data such as revenue projection, cost of development, cash flow, etc., you could carry out a cost and benefit analysis to show the breakeven point and ROI.

   In Section 3, list the high level user requirements, which are similar to the ones I gave you above. The list I gave you, however, is incomplete and is not well-organized. Some of them are non-functional. You need to expand and organize the high level requirements, for example, by actors.

   In Section 4, you will expand the high level requirements in Section 3 into more detail. For example, in Section 3 you have a high level requirement such as "A B4U subscriber needs to register with B4U and create a profile." In Section 4, you will need to expand and include details of the registration process requirements and what the profile will entail.

   There will be a lot of redundancy. We do it on purpose (read the lecture notes, videos, etc. in Course Materials.)

   In Section 5, you will identify the constraints and non-functional specs. I have not given you much information on them. You need to brainstorm and "imagine" many of them. The student sample and materials on Blackboard will help you understand them.

   Finally, in the References section, write down the websites, papers, Apps etc. that you have read and a brief description of them.

Note: The report must be coherent and professional. You should set up your own style in Word such as font and font size, margins, etc. Page numbers are a must.