DEVELOPING A NEW BUSINESS ANALYTICS DEGREE PROGRAM TO MEET MARKET NEEDS AND STATE APPROVAL

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ABSTRACT

This case study explores the detailed process of developing an undergraduate business analytics program, such as assessment of market needs, faculty resources, industry support and advice, industry internships, capstone real-world hands-on projects, and support from university leadership, and approval by the state commission for higher education.

Keywords: Big data, business analytics, data mining, development of business analytics program

DESCRIPTION OF THE STUDY

E-business, e-education, e-government, social media, and mobile services generate and capture trillions of bytes of data every second about customers, suppliers, employees, operations, and other types of information. Such large pools of data or big data are now an important part of every sector of the global economy. For example, online retailers can track not only what customers bought, but also what else they viewed; how they navigated through the site; how much they were influenced by promotions, reviews, and page layouts; and similarities across individuals and groups. Traditional retailers simply couldn't access this kind of big data in such a timely manner. Obviously, using digital big data leads to better predictions; better predictions enable better decision making (Finch & Shockley, 2013; McAfee & Brynjolfsson, 2012). While businesses need professionals with skills and knowledge for mining big data and discovering business insights, how do business colleges develop and offer business analytics programs to meet the market needs? This research question is important for business and information systems educators to address.

BASIS OF THE STUDY

A research report from the McKinsey Global Institute (MGI) (Manyika, Chui, Brown, Bughin, Dobbs, Roxburgh, & Byers, 2011) found that big data can create significant value for the world economy by enhancing the productivity and competitiveness of companies and public institutions, thereby creating substantial economic surplus for consumers. For instance, MGI studied the sectors of healthcare, retailing, public services, manufacturing, and global personal location data services and reported that big data can generate significant financial value across sectors. McAfee and Brynjolfsson (2012) noted that big data analytics is a fundamental transformation of the economy and they have been convinced that almost no sphere of business activity will remain untouched by this big data movement. However, research showed a significant shortage of talents needed by organizations to take advantage of big data (Columbus, 2015; Marr, 2016; Finch & Shockley, 2013; Zhao & Zhao, 2016). For example, one-third of respondents of the IBM global survey of 900 business and information technology executives cited the lack of business analytics skills as the top business challenge impeding the better use of big data analytics (Finch & Shockley, 2013).

To explore how the U.S. colleges prepare students to meet the market demand for business analytics professionals, we conduct a case study of how a state university in the Midwest region developed a brand-new business analytics BA/BS degree program that received support from industries and approval from the state commission for higher education. The case study explores the details of the development process such as assessment of market needs, faculty resources, industry support and advice, industry internships, capstone real-world hands-on projects, and support from university leadership and the state commission for higher education.

IMPLICATIONS

The findings of the study will be valuable references for colleges planning to develop and offer the business analytics programs. In addition, the findings will enable students interested in big data analytics to better understand the academic program by knowing the market needs, course offerings, industry support and involvement, internship and employment opportunities, which are important in choosing their majors.

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THE IMPACT OF DUAL OFFERINGS OF A CIS PROGRAM:
FACE-TO-FACE, TRADITIONAL VERSUS 100% DISTANCE EDUCATION
WILL WE LOSE THE FACE-TO-FACE STUDENTS?
RESEARCH-IN-PROCESS

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ABSTRACT

Computer Information Systems (CIS) is where technology meets real world demands. Today's complex and inter-related global economies demand well-rounded professionals possessing, not only a strong technological tools set, but a diverse portfolio of skills that include a solid understanding of business/business processes, leadership and project management, information technology oriented skills, and exceptional interpersonal and communication skills. CIS is one of the few, inter-disciplinary computing-related degrees today that adequately prepare students to meet these multi-faceted workforce demands. This research is driven around the interest to determine the effect of one university providing two, separate pedagogy offerings to students for a particular CIS program - - - one totally online and one as a hybrid offering combining online and traditional, face-to-face. The author's viewpoint is that the 100% totally online offering will have a negative impact to future student enrollment in the hybrid/traditional face-to-face program.

Keywords: Computer Information Systems, program, pedagogy, distance education, online, face-to-face

BACKGROUND

A CIS program at a university in Northeastern USA offered a face-to-face, traditional experience to students starting in the fall 2005. As the program gained traction, the student enrolled in the program averaged @75-90 students per academic year from 2011-2016. Starting in the Spring 2016 term, the university offered another alternative to students interested in attaining their Bachelor of Science degree in Computer Information Systems -100% asynchronous online classes to meet the needs of busy students and professionals (requirements for admission include an associate degree in business or an information systems related discipline) and can be completed in as little as 24 months if attending full time.

Over the past decade, higher education institutions continue to move programs to an online environment to increase student enrollment and decrease operational costs (Tallent-Runnels, et al., 2006). Additionally, the movement to online education raises the question on the level of depth and richness of the student experience, especially as it relates to student assessment and accreditation (Kop, et al., 2011).

As of the Spring 2017 term, at the university in Northeastern USA, the student enrollment for the traditional, face-to-face program has declined to @55-60 students, while the online, distance education program is growing at a rapid pace with @90-100 students enrolled for the Fall 2017 term. The faculty at the university is interested in determining if this is a pattern for future enrollment where more students will enroll into the 100% online offering as enrollment continues to decrease in the hybrid/face-to-face offering, as noted by Hanney and Newvine (2005). At this point, the research is in the early stages of development, where an instrument to gather enrollment data, analyze the findings, and provide overall conclusions could be attained through these two research questions:

Q1) Are the students enrolled in the distance education offering experiencing the same level of depth and richness in course content and experience as those in the face-to-face, traditional offering? That is, how do the two offerings compare related to student assessment and ABET accreditation?

Q2) What impact does the distance education program have to the future of the traditional, face-to-face offering as those enrollment numbers continue to decline?

PROPOSED METHODOLOGY

My intention is to use instruments to measure and assess the outcomes for the research questions through the following data gathering process and analysis of findings:

For Q1, this questions relates to the ABET accreditation process which the CIS program has attained, and surpasses national academic for its discipline. It has been designed by a team of scholars and professionals with extensive real-world experience, in conjunction with CIS professionals, who are currently working in industry and represent a sub-group of potential employers of our CIS graduates.

As part of the ABET accreditation process, student outcomes are assessed throughout the curriculum to determine how students are meeting the objectives of the overall program, in particular, critical courses on content understanding. Our assessment of data results comparing the student outcomes for distance education courses versus student outcomes for traditional, face-to-face courses will determine the level of adequacy on student knowledge gained related to depth and richness.

For Q2, historical data from the university's admissions function for years 2016-2018, and eventually beyond 2018, will compare student enrollment for the two offerings to confirm a pattern and trend that may be affecting the enrollment future of traditional, face-to-face student offering.

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A PICTURE TELLS A THOUSAND WORDS:
STORY VISUALIZATION USING CORENLP AND D3

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ABSTRACT

This abstract describes a software application that helps users visualize a story by using of natural language processing (NLP) software and data visualization. The term "story" refers to a narrative that involves people, groups, organizations, or other entities (subjects) performing actions that affect other people, organizations, or entities (objects). These events occur in certain places and at certain times. The software identifies these key elements of the story (subject, objects, actions, time, place, and other contexts), and represents the relationships between these elements for each event that takes place in the story. In other words, the software attempts to visually and interactively answer this question: Who did what to whom, where and when did it happen, and what else was going on at the time?

There is a well-known saying: "A picture tells a thousand words." Visualization software can be used to draw a picture of this narrative via word clouds showing the interaction between subject, object, actions, places, times, and other contexts. This kind of visualization, leveraging on the NLP functionality discussed above, can help a user quickly capture the essence of a story.

Keywords: Text analytics, natural language processing, data visualization, word clouds

EXTRACTING STORY ELEMENTS USING CORENLP

Stanford's CoreNLP (https://stanfordnlp.github.io/CoreNLP/) is a Java API consisting of a suite of tools called *annotators* that can perform many NLP functions. The annotators provide several useful services, including the following:

- Breaking a text document into individual sentences
- Tokenizing a sentence (breaking it into individual "words")
- Identifying parts of speech (POS) within a sentence (nouns, verbs, adjectives, adverbs, etc.)
- Named entity recognition (NER) – recognizing names of people, places, organizations, etc. Constituency parsing – constructing taxonomies of noun phrases and verb phrases of a sentence
- Dependency parsing – construct a graph of dependency relationships between terms in a sentence
- Co-reference resolution – finding all expressions that refer to the same entity in a text

Using these tools, I built an application that attempts to extract the actions (verbs), subjects, objects, places, times, and other contextual features that make up a written story. Figure 1 shows an output from analyzing a piece of text. CoreNLP takes the given body of text, and performs the above tasks on them. Of particular importance are: (a) the POS annotator, which identifies the verbs and nouns of each sentence; (b) the dependency parser, which enable the application to identify the subjects and objects of each verb; (c) the named entity recognizer, which identified people, places, dates/times, organizations, and other entities; and (d) the coreference resolution annotator, which helps the application recognize when "he", "she", "it", etc. refers to a particular named entity.
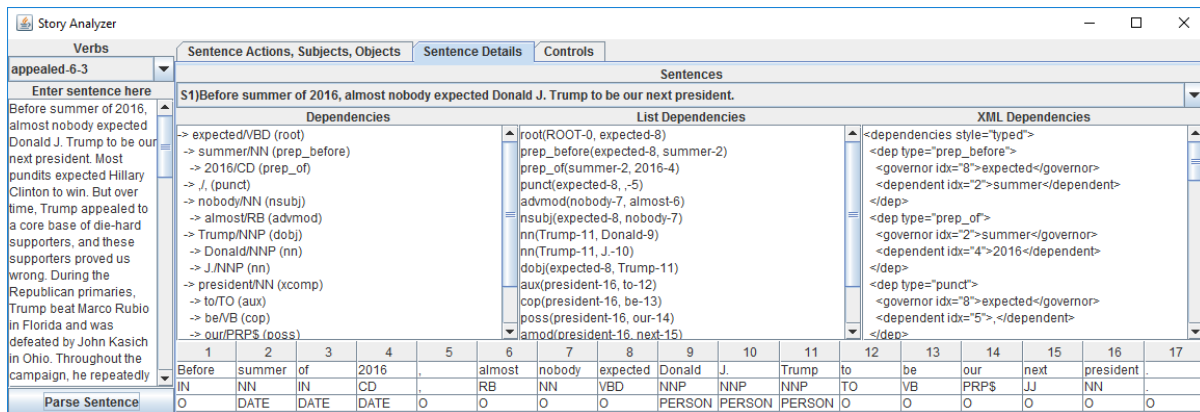
Figure 1. Showing dependencies, parts-of-speech, and named entities from CoreNLP.

VISUALIZATION USING D3.js

After extracting story elements from the text, the application uses a JavaScript visualization API based on scalable vector graphics (SVG) (https://github.com/jasondavies/d3-cloud) to create interactive and interrelated word clouds, shown in figure 2.
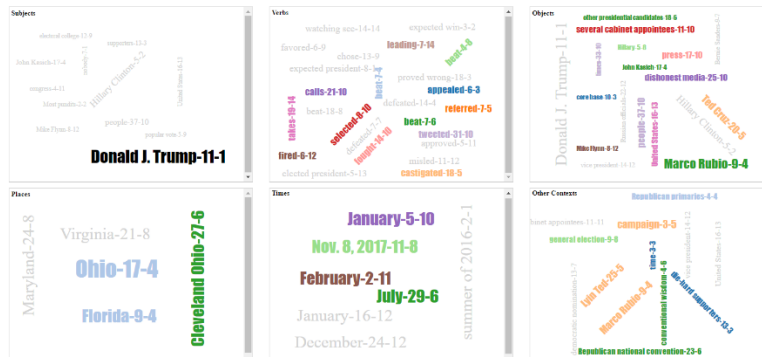

Figure 2. D3-generated word clouds for story visualization

Here you see six word clouds. Each word or phrase in a word cloud is displayed with its position within the sentence and sentence number of its first occurrence. Within a cloud, font size indicates impact or prevalence in the story. When the user hovers the mouse over a word in one cloud, the visualization highlights its related words in the other clouds. Color is used to identify the specific relationships.

CONCLUSION

This application merges NLP with visualization software to extract meaning from textual documents. There remain many limitations and challenges. The current state of NLP is less advanced and reliable than working with structured data. Nevertheless, as technologies advance, and developers become more familiar with the tools available, opportunities for building useful software for extracting and presenting meaning from text will continue to grow.

ASSESSING STUDENT PERFORMANCE IN A BUSINESS INFORMATION SYSTEMS COURSE: USING DATA ANALYSIS FOR CONTINUOUS IMPROVEMENT AND EXTERNAL/INTERNAL DOCUMENTATION NEEDS

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ABSTRACT

Assessing student performance in a business information systems course is critical for both continuous improvement and external/internal documentation needs. Thus, the purposes of this presentation are (1) to describe how students in an information systems department course are assessed and (2) to describe how assessment results are employed for both continuous course improvement and external/internal documentation needs. To ensure consistent assessment across all course sections, common techniques are used when collecting student performance data. The evolution of these techniques will be discussed throughout the presentation. The presentation will include a discussion of how student performance data has been used for continuous course improvement and external/internal documentation needs.

Keywords: Continuous improvement, assessment data analysis, external/internal documentation

MANAGING HIGH-RISK PROJECT AND IT COMPLEXITY FOLLOWING A CORPORATE RESTRUCTURING

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Keywords: IT project management, high reliability organization

DESCRIPTION OF THE STUDY

We describe the preliminary results of a field study of a major corporation, which was required to reconstruct its entire IT, infrastructure, literally from scratch, following a divestiture from its parent organization. The management challenges included the underlying complexity of the IT systems as well as the project required to implement them, highly ambitious, rigid and legally-binding time deadlines for project completion, highly rigid (and ambitious) performance standards required of the implemented system, and in this particular case, exceptionally high risk and cost of failure. The project management strategy utilized in this case is particularly illustrative because the outcome was an unqualified success. The project was completed on time, under budget, and exceeding the ambitious performance standards imposed. The goal of this study is to identify the characteristics of this successful IT implementation strategy under these challenging circumstances, to develop a management framework from these characteristics, and to present the framework as a potential solution for CIOs facing similar circumstances.

BASIS OF THE STUDY

In developing the framework, we borrow from management strategies in other domains characterized by high-complexity, high-risk, and high-cost-of-failure environments. Specifically, the environment within which an IT infrastructure is constructed and enterprise-level application systems are deployed is, under the circumstances present in this case, analogous to highly complex, uncertain, and high stakes domains – such as nuclear power plant and air traffic control operations – requiring the formation of what are termed High-Reliability Organizations (HROs) (Roberts, 1990; Weick & Roberts, 1993). We propose that HRO-based management strategies used to achieve operational goals and avoid accidents in these traditionally high-risk environments can guide the formation of CIO management strategies facing conceptually similar types of risks. However, in doing so we distinguish the operational risk inherent in these traditional environments from the implementation risk shown in this case. Here, the HRO does not necessarily pertain to 'accidents' or 'safety', although those elements exist, but also to other analogous elements of the implementation environment, including exposure to lawsuits, damage to corporate image and perhaps viability, financial and (perhaps) physical harm to consumers, and personal/professional risk. The stakes are still exceptionally high.

The research project is unfolding essentially in three steps: 1) identify the management practices employed by the CIO and management team, 2) identify the environmental characteristics that prompted the development and use of those practices, and 3) determine a framework, derived from research into high-reliability organizations, that links management practices to precipitating environmental influences and that can be applied in other IT implementation projects. To explore these issues, we are engaged in an explanatory case study that seeks to explain observed behaviors or events with regard to how or why they occurred (Yin, 2013). In adopting the case method approach, we are following a process of analytical generalization that essentially pattern-matches the observed elements of the case against the characteristics of complex, risky systems and HRO management techniques. In so doing, and again following Yin, we are collecting multiple sources of data – including interviews, documents and archival records. Because the focus is on managerial decision-making, we initially targeted the project leaders, particularly the CIO who initiated and managed the high-reliability strategy. In addition to the perspectives provided by each of the interviewees, they also have supplied a significant amount of project-related documentation, including project planning documents, business process documents (including customer billing and supplier transaction processes), and contemporaneous archival records such as employee newsletters and training documents.

IMPLICATIONS AND CONCLUSIONS

This research is an extension of the HRO concept into the domain of strategic information technology implementation, particularly within the high-stakes, high risk circumstances illustrated in this case. HRO historically has focused on constituent safety as the primary objective and outcome of a socio-technical system, the sense being that a well-structured management control system will lead to a reliable, failure-free system, and a reliable system in turn will lead to enhanced safety (Bourrier, 2011). In this respect safety results from the mitigation of a particular set of risks inherent in a particular context; e.g., the potential of a nuclear power plant meltdown or an airline disaster caused by the failure of an air traffic control system. However, because risk occurs in many different forms depending on the domain and the particular setting, and because the fundamental objective of an HRO is avoidance of catastrophic system failure (however one might define the notion of a 'catastrophe'), the concept of an HRO and the application of high-reliability theory applies to areas beyond these traditional safety-focused environments.

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CYBERSECURITY EDUCATION: USING FACEBOOK'S OPEN SOURCE CAPTURE THE FLAG PLATFORM AS A HANDS-ON LEARNING AND ASSESSMENT TOOL

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PROPOSED STUDY

Demand for skilled cybersecurity professionals in both the government and private sector has led to innovative methodologies for students to gain hands-on skills and to practice those skills in a safe and enjoyable environment. Cybergames are now being used by educational institutions and the private sector alike. One such game is the Capture the Flag (CTF) format where individuals and/or teams compete against each other in an attempt to achieve a digital goal like credential retrieval or data exfiltration (Kerner, 2016). Because college graduates and entry-level employees often lack the real world experience and hands-on practice they need to be successful in the cybersecurity industry, and traditional methods of learning are not always effective, alternative methods of skill enhancement should be considered. This study investigates the Facebook's CTF platform as a good cost effective learning and assessment tool for undergraduate and graduate cybersecurity students for an online university.

BASIS OF THE STUDY

Approximately 1,200 graduate and undergraduate college students will be invited to participate in the study. The study will include a pre-assessment of 20 multiple-choice questions in a variety of cybersecurity topic categories. The pre-assessment will be scored to determine student knowledge of the concepts prior to the CTF competition. The participants will then engage in the CTF competition for a period of 48 hours, practicing their skills related to the cybersecurity topics addressed in the assessment. After the competition, a post-assessment with the same questions (reordered) will be administered and scored.

In addition to the pre/post assessment results comparison, feedback on the experience will be collected students via an online survey. If the results indicate the competition had a positive effect on the participants' skills, the online university may use the platform in some of the security course offerings where the lab part of the course is a CTF competition. The CTF platform is customizable so challenges can be geared to the course topics and objectives. In addition, various university clubs will have access to the system in the future to run CTF competitions and increase student engagement.

IMPLICATIONS & CONCLUSIONS

The implications of this study could be that the CTF competition and other similar interactive activities can enhance the students learning and engagement. The participants will gain the valuable hands-on experience they will need in the real-life scenarios they will encounter in the workplace. Although the setup of the CTF competition required a dedicated faculty member to complete several days of preparation, the actual cost to facilitate the competition is minimal in comparison to other vendor provided labs that offer similar hands-on experiences. In addition, the CTF platform can be customized to integrate with specific curriculum and modified as technology or trends in cybersecurity emerge. In the near future it is expected that Facebook will share a master repository of questions and flags, which would reduce the overall time and effort necessary to set up the platform for each competition.

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FIELD DEPENDENCE AND FACULTY'S VIEWS OF DIFFERENT ONLINE INSTRUCTIONAL TOOLS

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ABSTRACT

This exploratory study looked at faculty's views of twelve different instructional methods common in online learning. The faculty were grouped by their level of Field Dependence as measured by the Group Embedded Figures Test. Past research had focused on student performance in online learning. The results indicated moderate correlations between the faculty's views on Instructor Lecture Video, Video Tutorials and the use of Worksheets and their raw score on the Group Embedded Figures Test. Grouping the subjects into three levels of Field Dependence and running ANOVAs against the Likert ranking of the twelve instructional methods yielded p values greater than .05.

Keywords: Field dependence, online instruction, faculty experience

THE RASPBERRY PI AS AN INFORMATION TECHNOLOGY LEARNING PLATFORM: A CASE STUDY

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ABSTRACT

College graduates and entry-level employees often lack the real world experience and hands-on practice they need to be successful in the information technology industry. The lack of hands-on skills becomes more challenging for online college programs as there is no physical lab for students to do their work. One solution to help with this problem is to use the Raspberry Pi as a learning platform. The Raspberry Pi is a low cost computing device that can be used as a traditional computer or used as a special purpose computer. The Raspberry Pi is compatible with many types of operating systems including Linux, Google Android and Microsoft Windows. Using the Raspberry Pi in Information Technology based curricula provides a student with a low cost way to learn hands-on skills that include networking, programming, and cybersecurity skills. The purpose of this descriptive case study was to show that with the addition of projects utilizing the Raspberry Pi could give students the ability to gain hands on skills. The objectives of this case study were to complete three simple projects utilizing the Raspberry Pi version 3 (RP3), analyze the skills gained from those projects, and compare those skills to skills that were acquired after the completion of an online Bachelors of Science in Management Information Systems (MIS) degree from Minot State University. The results of the case study show that after the completion of the projects, skills were achieved that can add potential benefits to students in the online MIS degree, better preparing them for real world technology scenarios, therefore improving their job prospects.

Keywords: IT curriculum, Raspberry Pi, hands-on learning, embedded systems, programming, security, cybersecurity, networking

INTRODUCTION

College graduates in Information Technology (IT) programs often lack real world experience and hands-on practice that they need to be successful in the IT industry. Murphy (2016) identifies the need for hands-on experience with the newest tools and technologies as one of the four trends that an IT professional needs to be aware of. Sabin, Snow, and Viola (2016) also discuss the importance of student exposure to hands-on projects to prepare graduates to meet the expectation of employers hiring computing and IT professionals. That expectation is that the graduates are ready to tackle authentic problems in real world scenarios.

The Raspberry Pi is a low cost computing device that can be used as a traditional computer or used as a special purpose computer. The Raspberry Pi is compatible with many types of operating systems including Linux, Google Android and Microsoft Windows. Using the Raspberry Pi in Information Technology based curricula provides a student with a low cost way to learn hands-on skills that include networking, programming, and cybersecurity skills. The Raspberry Pi can be used to create a number of real world scenarios so that students can practice.

EXPERIENTIAL LEARNING THEORY

Kolb's (1984) experiential learning theory supports the need for concrete experience as part of the learning cycle. Step one in Kolb's learning cycle is concrete experience where the student experiences an activity through field work or a lab. Step two is conscious reflection on the experience. Conceptualizing a model of the experience is step three, and in step four, the student plans how to test a model for a future experience. Through the use of the Raspberry Pi, concrete hands-on experience can be added to the curriculum.

RESEARCH METHODOLOGY

The objective for this research was to show the hands-on skills that can be gained by MIS undergraduate students who have chosen to complete an online program where hands-on experience is limited. The research focused on the following research question: Can the use of Raspberry Pi add to the skills currently learned in the MIS undergraduate program? A descriptive case study methodology was used to determine whether additional IT skills were achieved, over and above those currently gained in the MIS undergraduate curriculum. Case study methodology is used when you evaluate a contemporary phenomenon in a real-life context (Yin, 1994). Three RP3 projects were used in the study. This was a preliminary study conducted by one person, an undergraduate student in the MIS program, to determine if there is value in pursuing this study on a larger scale. Future studies would incorporate interviews and student performance data to further evaluate the use of Raspberry Pi as an addition to the curriculum.

The researchers completed the following steps in the study:

1. Document the skills gained using the current curriculum in the MIS undergraduate degree
2. Complete a project to demonstrate the ability of the RP3 to be utilized as a web server and document the skills gain from the completion of this project.
3. Complete a project to demonstrate the ability of the RP3 to send and receive encrypted messages and document the skills gain from the completion of this project.
4. Complete a project to demonstrate the ability of the RP3 to create a retro game emulator and document the skills gain from the completion of this project.
5. Compare the skills gained in the projects to those currently being gained from the courses that make up the online MIS program.

RESULTS

Current MIS Curriculum Skills

To begin the justification for the need to incorporate the RP3 in the MIS curriculum, an analysis of the current hands-on skills gained by completing the courses that are currently in place was completed. The analysis included any skills where the student was taught in a do it yourself approach utilizing hardware or software. Table 1 includes the courses in the MIS program and the hands-on skills that are acquired in each class.

Table 1: MIS Curriculum and Skills

Course	Potential Skills Acquired After Completion of Course
Introduction to Web Site Design	• Constructed Web Pages where HTML/CSS code was used creating fonts, colors, graphics, lists, tables, CSS styles, and links and where Web editing software was used • Constructed and examined Web Sites that used a Web editing software that will utilize graphics, links, lists, anchors, menu bars, forms, tables, media, and CSS styles, and CSS layouts • Applied the principles of HTML/CSS code in preparing Web Pages and of web editing software in preparing Web Pages

Spreadsheet Applications	• Constructed spreadsheets using Excel 2016 software and used spreadsheets operations for data gathering, analysis, and presentation • Used data functions including, but not limited to, sorting, filtering, conditional formatting, subtotals, pivot tables, and charts for data gathering and analysis • Applied and interprets data from text files and databases for data gathering and analysis • Created and modifies charts and graphs to use for situational analysis and created variable tables and scenarios to use for problem solving and situational analysis • Calculated Math & Statistical, Financial, Date and Time, Lookup, and Logical functions for problem solving • Interpreted a formula, and traced and tracked changes to a workbook • Selected and used validation rules, range names, and macros in spreadsheets • Used the VBA Editor to create, edit, and run macros in spreadsheets
Project Management	• Analyzed and managed IT projects with the use of MS project 2013
Collaborative Computing	• Demonstrated effective use of collaborative tools such as SharePoint
Data and Information Management	• Identified the people, hardware, software, network, and data components of an organization's database system • Demonstrated database maintenance and security measures relevant to an operational database • Demonstrated how to use a CASE tool to create the entity-relationship model • Applied and adapted methods and techniques used to conceptually and physically design a relational database
IT Infrastructure	• Examined the infrastructure of a local area network and wide area network • Troubleshooting and diagnosing issues and resolve basic workstation, network and server issues using IT standards/governance • Applied the tools and products necessary to manage, troubleshoot and maintain a data center infrastructure
Enterprise Architecture	• Utilized techniques for assessing and managing risk across the portfolio of the enterprise • Evaluated and planned for the integration of emerging technologies. • Administered systems, including the use of virtualization and monitoring, power and cooling issues • Managed proliferating types and volume of content
Security and Information Assurance	• Performed risk analysis and risk management • Designed and guided the development of an organization's security policy
System Analyst	• Used MS Projects to plan and manage an information system development project • Use dMS Team Services to collaborate in a virtual environment and a CASE tool to develop the process and data model

There were also classes in the online curriculum where no hands-on skills were acquired. Those classes include Management Information Systems, Technology Management, IS Strategy, Management & Acquisition, Outsourcing Management. IT Audit Controls and MIS Seminar. Finally, there were two capstone courses for the program entitled Projects in MIS and Web Based Application Development. Students were given the chance to work on a variety of different projects. Due to the different options given to the students to meet the requirements of this course, there is no clear skill that can be gather from the completion of the capstone courses.

After the analysis of hands-on skills was completed, it was clear that students did learn some hands on skills but there were holes that might be filled with the addition of the RP3 projects. The holes that might be filled included, but are not limited to, lack of variety of coding languages used, lack of basic computer skills like identification of system components and system setup and lack of practice utilizing skills collaboratively to complete tasks or projects. Students were not asked to assemble a computing device or determine the different parts of a computer system. Another lesson that seemed to be missed would be to utilize different skills together to complete a project.

Raspberry Pi Projects

Project One – Web Server. The first project was to create a web server and a simple web page using the RP3 (Raspberry Pi Foundation, 2017). This was a real world example of setting up a web sever, observing how a basic web server worked and the framework that made it work correctly. The framework included various files stored correctly in the appropriate location on the server. In addition, HTML and CSS coding was done to create webpages. The web pages were accessible by both a desktop browser and a mobile browser

Project Two – Sending Encrypted Messages. The second project was about security. It allowed for the creation of encrypted messages to be sent using a one-time pad (OTP). This project enabled the researcher to analyze and run complex Python code to encrypt a message to be sent and then decrypt the message that were sent utilizing OTP (Secret Agent Chat, n.d.). The researcher also created a menu for saving the encrypted text. The basic steps were to utilize Python and Python shell for the development of code and witness the encryption and decryption of messages.

Project Three – Raspberry Pi as a Retro Game Emulator. This project was a simple simulation of how to use a RP3 as an emulator (Koslowski, 2017). The basis tasks that were completed in this project were to download an image to a device, utilize software to burn the image to a microSD card, connect the necessary peripherals to the RP3 to use the device properly, send ROMs to the RP3 over a connected Wi-Fi network and learn basic smart codes for the gaming system called the RetroPie. The basic steps completed for this project would include downloading Retropie, utilizing Etcher to move the Retropie image to the micro SDcard and then booting the RP3 on the imaged SD card. After, ROMS were sent to the RP3 over a connected network so that an end user could play different retro games.

After the projects were completed, there was an analysis completed of the skills that were learned from each project. Table 2 is a summary of the projects that were completed and the skills that were acquired from each project.

Table 2: Summary of Projects

Project	Skills Acquired
Raspberry Pi Setup	Connected device to a Wi-Fi network Connected peripherals to device Installed operating system to device
Web Server	Used HTML Used CSS Used Flask Used Python Used basic terminal commands Used intermediate terminal commands

Encrypted Messages	Used a One-Time Pad (OTP) Simple to complex coding Created function to open a file Created function to encrypt text Created function to decrypt text Created function to create menu Utilized Python shell Determined insecure ciphers
Retro Pie	Downloaded an image Utilized software to burn the image to a microSD card Connected the necessary peripherals to the RP3 Sent ROMs to the RP3 over a connected Wi-Fi network Used basic smart codes for the gaming system RetroPie

SUMMARY

It was clear in comparing the skills learned in the RP3 projects to the current skills learned in the undergraduate MIS program, that new skills were added. The only overlap in skills between the two skill sets was in using HTML and CSS. The RP3 projects added learning several different programming languages, encryption, decryption, ciphers, and various hardware tasks.

The skills that were acquired using the RP3 also built upon skills that were learned in the current MIS undergraduate program. The addition of RP3 projects to the undergraduate MIS curriculum would increase hands-on experience for students in the areas of hardware setup, networking, understanding of basic computer components, security, and programming. These technical scenarios provide the experiential learning that makes graduates more valuable to prospective employers.

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MOBILE READINESS OF THE FORTUNE TOP 100 COMPANY'S WEBSITES

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ABSTRACT

As more and more users are getting to use smart phones and tablets due to the ease of use, portability, and a large range of free applications, organizations that use their websites as a vehicle to deliver important information to users should revisit their sites to check for any potential improvement for increasing mobile device users (McCorkindale & Morgoch, 2013). This paper analyzes mobile readiness of the Fortune top 100 company's websites. The performance of a site for mobile devices is measured using 1) a page weight in terms of the number of bytes, 2) an Alexa 1,000 benchmark, which benchmarks the company's website mobile ready score against the distribution of the top 1,000 Alexa sites, 3) a visualization for high- (375 x 667 pixel), middle- (320 x 533 pixel), and low-tier (240 x 320 pixel) devices, and finally 4) an actual loading speed provided by a Google tool. In addition, 38 items categorized as major failure, minor failure, and passes are tested to scrutinize the technical components of the sites. This paper also suggests the way to improve performance that can significantly impact a user experience and the organization's potential profit.

Keywords: Mobile Readiness, Fortune 100 Companies, Websites for Mobile Devices, Mobile Ready Score

RESEARCH METHODOLOGY

Data were collected from a site that contains the list of fortune 500 companies and their websites (ZYXWare, 2014). An obtained URL of each company was used as an input to both a web performance tool at Google (PageSpeed Insight, 2016) and the MobiReady, which is a free tool for developers, designer, and marketers to test website performance on mobile devices (MobiReady, 2016). As shown in Table 1, technical components of the sites were tested to find sources that drag the speed of the sites and to suggest a way to improve the performance of the sites.

Table 1. List of some test items

Items	Description
Image crunch	This test determines if your page make use of images which are larger than necessary. Image files often contain metadata and other information which is never displayed and can be stripped out to reduce the image file size. Smaller files will transfer faster and result in a quicker page load time.
DOM too large	This test determines if your page DOM (Document Object Model) is excessively large. Larger page DOMs require more memory and their extra complexity require additional data transfer time. Reducing the DOM complexity and size drastically affects page load time
ETag support	This test determines if your page resources are delivered using valid ETag caching support. ETags allow the browser to better understand which content can be cached and which should be re-validated on each page load.
JavaScript placement	This test determines if your page has JavaScript includes in inappropriate places. Grouping JavaScript includes together at the end of the page markup is optimal for page load while the JavaScript files are downloaded.

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ENHANCING REQUIREMENTS ELICITATION SKILLS IN THE CLASSROOM

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Keywords: Requirements elicitation, interview techniques, experiential learning

BRIEF DESCRIPTION

The process of collecting requirements is a complex and iterative process which involves elements of "discovery, emergence and development" (Zowghi & Coulin, 2005). The most common technique for eliciting requirements is an interview where IS analysts speak with business users about what they need from their new system. Gathering requirements is arguably the most important phase of developing an information system but is often times done poorly leading to systems that are not aligned with the needs of the organization (Browne and Ramesh, 2002). At James Madison University (JMU) in our Computer Information Systems (CIS) department, this particular problem was highlighted by multiple industry partners during various Executive Advisory Board meetings over the past several years (2012-2016). That is, when entering the job market, JMU/CIS students were not equipped with the skills and abilities to gather requirements in a competent manner. Thus, several CIS faculty members decided to pursue the goal of enhancing our students' abilities and skills to elicit requirements via interviews. The purpose of this presentation is to highlight our research methods and share our success stories with colleagues from other universities. The qualitative methods used in developing and validating a rigorous requirements elicitation rubric will be discussed along with the techniques that we now use in the classroom for enhancing our students abilities to elicit requirements.

BRIEF METHODOLOGICAL DESCRIPTION

A rubric was developed to evaluate requirements elicitation interviews. A rubric is defined as an assessment tool that can be used in the qualitative evaluation of complex work (Jonsson & Svingby, 2007). The rubric was developed using 2 independent qualitative techniques that included: a content analysis of a focus group and a multi-vocal ethnography of student interviews. This phase of our research was guided by grounded theory where concepts and results emerge from the data. After developing the rubric, it was then presented to our students as a means of developing their skills. Our students were then asked to take part in a mock requirements elicitation interview that was videotaped for the purpose of determining improvements and as a learning tool for the students.

IMPLICATIONS

This research addresses the call of industry to enhance our students' ability to elicit requirements. The results of our research show a significant improvement in our students over a three year time period. Thus, we believe that our techniques provide a solid learning foundation that transcend a simple book-based discussion. This research is in the beginning phases and we look forward to collaborating with IASIS colleagues to better develop our research findings and requirements elicitation research agenda.

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EFFECTS OF HUMAN FERTILITY RATES ON
THE INFORMATION SYSTEMS INDUSTRY

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Keywords: Information systems, global human demographics, population growth, fertility rates, outsourcing, immigration, productivity

BASIS OF THE STUDY

The Information Systems (IS) industry exists to facilitate information exchange within and among human organizations (Laudon & Laudon, 2018). Human demographics, then, are a key driver of demand for the socio-technical systems our industry produces and maintains (Baltzan, 2018). Since human fertility rates are a foundational determinant of all other human demographics, it is worthwhile to explore them and some of their effects on our industry.

STUDY DESCRIPTION

Earth's human population is growing with an overall fertility rate of about 2.42 children per woman, significantly above the nominal replacement rate of 2.1 (Central Intelligence Agency, n.d.). However, that homogenized statement hides relevant variations. Notably, the fertility rate is not uniform across all economies of the globe (Burd, 2016), nor is it uniform among all skill levels in the global workforce (United Nations Development Program, 2016). This study describes some of these variations with attention to existing and potential effects on the global IS field in three areas: social contexts affecting or affected by information systems (Long, 2013), user experience (front-end systems) (International Organization for Standardization, 2009), and enabling (back-end) systems (Burd, 2016).

This study will show that developing nations generally have higher fertility rates and lower life expectancy. It will also show that developed nations generally have lower fertility rates and higher life expectancy. These two trends have produced the paradoxical result that less-developed human populations are growing while more-developed populations are actually shrinking.

INDUSTRY IMPLICATIONS

The paradoxical shift of population growth to less developed regions of the world has a pair of immediate and inescapable implications for developed economies. First, traditional sources of skilled professionals are shrinking and will continue to do so for at least several decades (United Nations Population Division, 2016). Second, demand for skilled professionals is growing and will continue to do so for at least several decades (World Economic Forum, 2016). These two challenges have spawned three main mitigation efforts: taking work to the workers, aka outsourcing (Crow & Muthuswamy, 2003), bringing workers to the work aka immigration (Hollified, Martin, & Orrenius, 2014), and getting more work from each worker aka productivity (Blom, Canning, & Lubet, 2015).

Information systems are crucial to all these efforts:
- Outsourcing to less-developed population centers requires the development of
  - Back-end IS: local information infrastructure (Sook-Ling, Ismail, & Yee-Yen, 2015)
  - Front-end IS: user interfaces/experiences consonant with local needs (Information Resources Management Association, 2016)
  - Social IS: management of cultural, communication, and power-sharing differences (Edvardsson & Durst, 2014)

- Per Côté-Boucher, Infantino, Salter, & Bigo (2014), Immigration of skilled workers from population centers requires the development of

- o Back-end IS: databases and applications to manage immigration information
- o Front-end IS: reliable Identification, authentication, and vetting front-end systems
- o Social IS: Management to assure data confidentiality, integrity, and availability

- Increased productivity of existing local skilled workers requires the development of
  - o Back-end IS: cloud-based artificial intelligence (Ebling, 2016)
  - o Front-end IS: mobile digital assistants, collaboration tools, and robots (Ebling, 2016; Pratt, 2015)
  - o Social IS: ethics principles for using productivity tools and helping displaced workers (Marcolin, Miroudot, & Squicciarini, 2016)

CONCLUSIONS

This study concludes that fertility variations have resulted in a population shift away from developed economies. For the near term at least, mitigating the effects of this shift rests on the IS industry's ability to develop and deploy systems that facilitate global management of outsourcing, immigration, and worker productivity on an unprecedented scale.

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STRUCTURAL PROPERTIES OF ONLINE SOCIAL NETWORKS:
A CRITICAL REVIEW

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Online social networks can be represented and analyzed as graphs. Structural approach to capture the properties of such graph structures is to model them as graphs whose nodes represent the dynamical units, and whose links stand for the interactions between them. Understanding these network graphs is important, both to improve current systems and to design new applications of online social networks.

Structure-based approaches are approaches, which based on social network structure analysis. These approaches include such as centrality methods, the PageRank method, and the local clustering coefficient method. As an example, a semi-local centrality method based on degree centrality and betweenness centrality can be used to examine node importance in a large-scale online social network. Indegree metrics, for example, can be used to identify influencers on Twitter.

We review the major concepts of graph theory and research findings recently achieved in the study of the structure and dynamics of online social networks. We exam the random graphs, small-world, and scale-free properties of online social networks, and summarize the relevant applications of these ideas in various research disciplines. Researchers also need to cope with a series of typological properties, such as degree distribution, small-world phenomenon, degree correlation, reciprocity, and different attributes of various activity networks.

The topological characteristics are most likely static, thus no matter how frequent users' interaction are, their influence strength are taken equal under the structure-based approach. Therefore, structure-based approaches cannot maintain their effectiveness and accuracy when employed with online social networks. Several simulation studies show that the influence of the nodes not only depend on their network topology, but also are dramatically influenced by the action frequency. Developing models can be used to simulate the growth of an online network and reproduce its structural properties. On the other hand, many relevant research questions arise when studying complex networks' dynamics, such as learning how a large ensemble of dynamical systems that interact through a complex topology can behave collectively.

The structural properties reported here can help in understanding the mechanistic basis of behavior by generating predictions about future experiments involving social interactions and evolution of structure, monitoring dynamics of online social activity in response to stimulation. Finally, we discuss the implications of these structural properties for the design of online social network based system.

A BEHAVIORAL ANALYTICS APPROACH TO FINDING STUDENT SURROGATES IN ONLINE CLASSES USING BIG DATA: A CASE STUDY AT ONE UNIVERSITY

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STUDY PURPOSE

A simple search of local for sale/help wanted posting boards (e.g., Craigslist) will quickly identify individuals and services willing to help a student complete an online course or specific assignments for a fee (Moten, Fitterer, Brazier, Leonard, & Brown, 2013). Based on this increasing trend, many universities are using technology such as biometrics, audio/video event monitoring, locked down browsers, and the likes to prevent student cheating (Bedford, Gregg, & Clinton,2009). However, this technology has not been widely adopted due to product cost as well as the associated labor time and training needed to identify normal behaviors from cheating behaviors. This paper introduces the cybersecurity concept of behavioral analytics (Bou-Harb, Debbabi, & Assi, 2017) using internet protocol (IP) address reverse engineering and pattern recognition using different learning management system (LMS) database calls to identify a specific type of student surrogacy; the sharing of login credentials with the surrogate to submit coursework on behalf of the enrolled student. This topic is of great interest because this type of surrogacy appears to be growing in popularity since the enrolled student need not do any meaningful work other than share login credentials with the surrogate and pay a fee (Malesky, Baley, & Crow, 2016).

BASIS OF THE STUDY

The sponsoring university has provided resources and approvals to use sanitized student LMS data. In addition, 700,000 lines of LMS data have been provided for behavioral analytics model testing. This data sample represents 30 days of log data. Once the model is further tested, the goal is to run the heuristic against all LMS data or work with a software developer to integrate this type of heuristic into a dashboard similar to plagiarism detection software. The model was designed to look for one obvious sign of assignment offshoring as well as one less obvious behavioral pattern (similar to a virus scanner) both typical of a surrogate. The first model element are offshore IP addresses that are consistent with known surrogate countries the student is not likely to reside in or have visited. The second model element, the behavioral element, is an alternating pattern of database calls within a certain time/date period from different places. Using data base calls in the LMS, the VIEW and SUBMIT actions are logged differently (as well as other clicks). A student uploading a paper for submission is using the SUBMISSION database call. A student viewing or reviewing the uploaded submission is using the PREVIEW database call. Therefore, a surrogate will engage in the SUBMISSION calls from a specific IP address or geographic area. The student, who wishes to review the work of the surrogate will execute the PREVIEW calls from a different IP address or geographic area. This create an alternating pattern within the logs consistent with a surrogate relationship that can be identified.

IMPLICATIONS

An entire industry segment is developing around the prevention of online cheating and student surrogacy. However, there is little hard data to suggest how prevalent this behavior is. This study hopes to provide that data as well as the beginnings of a model to identify surrogate behavior. One surprise finding while doing this research was the presence of an extortion ring. When interviewing students who were discovered using a surrogate, there were several who referenced additional payments demanded by the surrogate or else be turned in for cheating.

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GENERATIONS Y AND Z:
ARE INSTITUTIONS OF HIGHER EDUCATION EQUIPPED
TO ATTRACT AND EDUCATE THEM?

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Keywords: Generation Y, Millennials, Generation Z, technology, higher education

ABSTRACT

Generation Y, sometimes referred to as *Millennials*, refers to the cohort of individuals born, roughly, between 1982 and 1994. Generation Z, the latest demographic cohort follows close on the heels of Generation Y. While there is no consensus on specifics this generation comprises of those born during the mid-1990s to early 2000s.

For institutions of higher education this means that the target market and entering student population for bachelor's degrees is Generation Z and, for graduate degree programs, it is the Millennials. Like others before them, these generations have been influenced and shaped by events, leaders, developments and trends of their time. However, the emergence and use of technology has had the most defining impact on these generations. For the millennial college bound students' technology has always been a part of their lives. Generation Z has never known a world without technology. While Generation Z are true "digital natives" both cohorts have advanced technical skills, are adept at finding information, multitasking, and, tend to have shorter attention spans. They are voracious consumers of technology and use it for education and entertainment.

While they share similarities, there are differences between Generation Y and Generation Z that will impact strategies used to attract and educate them. Having grown up during financially difficult times the Millennials are more budget conscious. On the other hand, given the current job market and their entrepreneurial aspirations Generation Z is questioning the value of a college degree. They feel that they can look up and learn whatever they want on the Internet and have questioned the need to invest in higher education that is neither relevant nor interesting and saddles them with debt with no guarantee of a job.

From a higher education perspective, both generations are increasingly relying on information provided by their peers. Their peers are easily able to use technologies such as social media to widely share their experiences with a particular university, college, program, class or professor. Educational Institutions and Educators will need to adapt to stay relevant for both these generations of students considering and entering college campuses. Educational institutions will need to revisit their marketing strategies. Understanding how these students use technology to communicate and how it influences their values and choices is the first step in attracting them, and, meeting their needs and building community on campus.

Educators will have to get creative in leveraging technology to engage, motivate, educate, and, entertain, these generations of students. In order to be effective educators we must understand our audience and the world they inhabit. This includes trying to understand what factors influence and motivate these generations of students and appreciate that different generations' differ in experiences, characteristics and habits that mold what they value and how they learn. By understanding their comfort and engagement with technology, as well as their outlook on work-life balance, instructors can flex their teaching techniques in and out of the classroom to successfully prepare these generations for the workforce. Several studies, statistics and projections indicate that the millennial generation will dominate the work-force both globally and in the US. As a result employers are focused on how to attract and retain them, and companies want to figure out how to sell to them. However, higher education has generally lagged in adopting and adapting to more effective and efficient methods to recruit and educate the digitally evolved generations on our campuses today.

In summary, each generation has a different set of experiences and values that drive their choices, and, a different approach to learning. As educators, we need to step up and adapt to stay relevant for these incoming generations of students.

DATA BACKUP: A NEW WAY TO MEASURE RECOVERY POTENTIAL

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ABSTRACT

It is increasingly important to understand the significance of the ability for a company to restore data after a disaster. Reports reveal many organizations cannot fully restore data after a disaster, be them by nature or human oversight. There are hardware failures, human error, or hacking that require an action plan that can deter or vanquish the failure of data backup success. This paper discusses a data backup indicator that assists management and IT specialists understand the reliability of the restoration of a data backup. It was found that the larger a company, the higher the desire for the data backup indicator.

Keywords: Disaster recovery, data backup, failed backup recovery, data backup indicator

OVERVIEW

Companies have lost valuable data because they lacked reliable data backup or restoration methods. Overall, data backup managers do not quantify data backup. This study investigates if there is a relationship between desire data backup performance indicator measurement tool and the size of the organization. The independent variable for the study was the size of the company and the dependent variable was the desire for a data backup performance indicator. The purpose of this quantitative study was to evaluate the desire for a data backup performance indicator based on Six Sigma principles that explained the accuracy of the data backup for business organizations in Greater Cincinnati. A backup performance indicator benchmarks the data backup to provide a platform for evaluating the condition of its backup.

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SUPPLEMENTING IS CORE CURRICULUM WITH HOT-TOPIC, INDEPENDENT STUDIES: A UX-DESIGN CASE STUDY

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ABSTRACT

This presentation will describe, from both a student and faculty perspective, the challenges and rewards associated with integrating online courses for industry into a community-based client project as part of an independent-study course.

Keywords: Student Engagement, independent learning, online courses, trending IS topics

CHALLENGES AND OPTIONS

Industry advisory boards and returning student interns identify potential gaps between industry and academia. Information Systems (IS) faculty must continually modify their curriculum to meet changes both in industry trends and changes in technology. The list of "hot topics" and industry trends varies (Ismail, 2016), but usually include big-data analytics, cloud computing, security, storage, social media, agile, and UX design).

One option to integrating new curriculum into the IS core curriculum is by modifying the pedagogical approach. Pratt and Hoepner (2016) "flipped" their classes to provide more time in class to investigate or apply concepts and skills. Other faculty integrated the agile scrum approach into their curriculum to modify both the pedagogical approach and the curriculum (May, Marshall, & Cardon, 2016). Both of these approaches worked because the faculty had expertise in the new content and the new content supplemented the existing course content. This approach would not work well in situations where those two conditions did not exist.

Ideally, faculty would be able to independently gain expertise in the new area of content/technology, develop a new course, pilot that course as a "Special Topics" course, and then hopefully integrate the new course into the curriculum. However, before investing significant time and effort in developing a new course, a faculty member would need a reasonable degree of confidence that a sufficient number of students would register for the course and that the course would likely be integrated into the curriculum. Budget cuts to education across the nation have resulted in the reduction of elective courses (especially under-enrolled courses), so special-topics courses are usually not approved. However, most universities still use "Independent Study" courses, and externally produced online courses for industry exist and can also be utilized.

CASE STUDY

Two students at a regional comprehensive university in the Midwest region of the United States were interested in completing a full course in User Experience (UX) design, with the option of hands-on practical application for a community client. Simultaneously, an industry advisory board member for that university was recommending we consider ways to integrate content from the UX Design courses from The Interaction Design Foundation (IDF) (https://www.interaction-design.org/courses) into our curriculum. Although the current *Systems Analysis and Design* course includes many UX design principles, the IDF online courses are much more in-depth and focused just on UX Design.

Both student authors on this presentation registered for an independent study course with the faculty author. Part of the course criteria included meeting weekly, taking at least one UX Design course, and delivering a UX-principled

design document—complete with prototype mockups—to a client at the end of the semester. Each of the students contracted independently with a local client to conduct a free UX assessment and redesign of the client's Internet presence. One client had a full-screen website; the other client focused on a mobile application.

Both the faculty and the two students registered for UX Design courses from IDF. The faculty and one student registered for an introductory course. The other student registered for an intermediate course and then stopped that course and started the same introductory course as the other two. The courses were paced: each new module was released weekly—you could not proceed ahead of your starting cohort. The online group discussions were focused on implementation ideas and included every student who had ever taken the course: the purpose was to learn from others no matter when someone took the course. Each course includes finite-answer and open-ended questions (graded by the IDF personnel). A student can monitor their completion and accuracy standing compared to all other students in the world. A certificate is available upon course completion.

FINDINGS AND RECOMMENDATIONS

Learning content together with students was a fun experience, but requires a certain level of self-confidence. Although the introductory courses were primarily review of the existing *Systems Analysis and Design* course content, the faculty member gained deeper insight. Students should start with the introductory courses, which provide the requisite background for the intermediate courses. Most IS students could probably handle multiple introductory courses simultaneously.

The students' work with learning and applying their learning qualified them for funding through the university's Office of Research and Sponsored Programs, but their applied work did not qualify as "research" by the Internal Review Board. In addition to learning UX Design principles, the students discovered the challenges of conducting [UX Design] research: gathering, synthesizing, analyzing data and then designing a data-driven UX experience.

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BORING CLASSES, BORED STUDENTS - WHAT TO DO?

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PROPOSED STUDY / PURPOSE

The purpose of our study is to identify key components of classroom learning experience for students and suggest techniques and tips to improve those experiences for students. In a pilot study, we asked students about their best and worst classroom learning experiences. Students mentioned that they often find class time boring. Since education is a service industry, we compared the situation of bored students with bored customers in service sector. In services, customers often feel bored when they are waiting. In operations management literature and practice, many studies address this issue over the years (Katz 1991, Hul 1997, Grewal 2003). A famous example is Maister's 1984 seminal article on the psychology of waiting lines. Maister discussed eight rules that apply to waiting customers and their perception of service quality. We propose that these rules can be applied to bored students in the classroom as well. In other words, learnings from services management can help in creating a better classroom learning experience for students.

RESEARCH QUESTIONS

- What makes classroom time boring?
- Can principles from management of service operations be applied to improve students' classroom experience?

RESEARCH DESIGN / METHODOLOGY

We will distribute online anonymous surveys to third and fourth year students in the college of business. The subjects will fill out an anonymous online survey providing demographics, GPA, and answers to questions regarding their learning experience in the classroom. We have collected pilot data in November 2016, and made changes to the questionnaire, and have a planned deployment of the anonymous online survey in October 2017.

HYPOTHESIS

- Hypothesis 1: Most Students find class time boring.
- Hypothesis 2: Most students obtain most of their knowledge for the course outside of the classroom.

We will analyze the results of the survey to find key factors that students perceive to be limiting their classroom learning experience. Some of the survey answers are free text so we use text-mining techniques to extract information and make inferences.

IMPLICATIONS / CONCLUSIONS

We plan to use principles from management of service operations to improve student's classroom experience. This study should be of interested to most of the academic community – specifically, educators that are interested in improving classroom experience for its students. Future research involves testing the proposed ideas in the classroom and seeing if there is any statistically significant difference in the students' learning experience during class time based on changes.

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CRYPTOCURRENCY FORENSICS

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ABSTRACT

Cryptographic (digital) currencies like Bitcoin have emerged as an alternate means of payment in global trade in lieu of traditional (fiat) currencies like the US Dollar or Japanese Yen. Bitcoin is both a form of currency and a cryptographic protocol implemented in software. Combined with its public ledger, Bitcoin represents a distributed, electronic, global currency using a wallet mechanism to enable end-users (individuals and firms) to store, receive and send payments. Digital forensic evidence exists as a direct result of the instantiation of this wallet. Forensic evidence also exists in the public ledger as a matter of course. Indeed, while Bitcoin transactions are considered pseudonymous, they are not fully anonymous. Transactions come from one wallet (technically an address) and go to another wallet (another address). This paper seeks to investigate the state of contemporary cryptocurrency forensics for consideration and inclusion in an introductory course in digital forensics.

Keywords: Bitcoin, digital forensics, global finance, cryptocurrency, Information Systems

UNIQUE SKILLS AND COMPETENCIES FOR COGNITIVE COMPUTING IMPLEMENTATIONS

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ABSTRACT

The adoption of transformational technologies like cognitive computing is predicted to have implications for many careers. The recent rapid adoption of cognitive computing applications in corporations is forcing information technology (IT) practitioners to reassess the skills and competencies necessary to implement future business solutions. From a practitioner's view, the cognitive computing era is requiring a set of unique skills and competencies for architects, developer, testers, and engineers to successfully implement cognitive computing within a corporation.

Keywords: Cognitive computing, technical skills and competencies, IT practitioner

INFUSING ENTREPRENEURSHIP INTO INFORMATION SYSTEMS USING RASPBERRY PI

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Keywords: Entrepreneurship, curriculum, Raspberry Pi, information systems

DESCRIPTION OF COMPLETED STUDY

The study of entrepreneurship has evolved and can often be found woven into the modern business school. While its study has crept into the information systems (IS) and engineering fields, there is little evidence to suggest that it is being taught in tandem with technical skill development (Pardede, 2015). As such, IS programs housed within business schools are particularly poised to meet this gap through the intentional fusion of entrepreneurship into IS programs. From 2014 to 2016, a course entitled Technology Ventures was developed in conjunction with a Coleman Foundation Entrepreneurship grant to utilize Raspberry Pi computers as a platform for product development and prototyping, business modeling, and ultimately, competition in a business pitch competition. Through this course, students were pushed beyond their comfort zone to blend their technical skills with an entrepreneurial mindset. These experiences fostered opportunities for students to be better prepared to enter the workforce to meet employer demands. A proposed study involves surveying former students to gauge the level to which the entrepreneurship content infused with IS technical skills is impacting their careers.

LITERATURE REVIEW

Entrepreneurship definitions vary across the landscape. Timmons considers entrepreneurship to be about creating something new where nothing existing before without regard for resources (1985). Babson College, known worldwide for its entrepreneurship-focused education, views entrepreneurship as a way of thinking, reasoning, and acting that is opportunity obsessed, holistic in approach, and leadership balanced (Montoya, 2010). "Entrepreneurship education has grown dramatically, as reflected in the increased student enrollment, formal entrepreneurship centers, intercollegiate business plan competitions, new entrepreneurship curricula and programs, and endowed chairs and professorships" (USDC, 2013, p. 6).

While future employers continue to seek new graduates who have the appropriate technical skills and ability to work in teams, 19.7% of respondents desire employees to have entrepreneurial skills, according to a recent National Association of Colleges and Employers survey (2016). Pardede noticed the intersection between information technology (IT) students and entrepreneurship as many graduates go on to work for small- to medium-sized companies; many of them startup companies in the technology industry (2015). Therefore, a course designed to teach entrepreneurial skills while honing technical acumen can provide students with the necessary tools to be successful in their careers.

IMPLICATIONS AND CONCLUSIONS

Designing a course that wove both technical skill development and entrepreneurship provided students with the opportunity to pursue a project for which they were passionate about while building skills in areas such as Linux, Python, and electronics. Students were able to learn additional technical skills as a byproduct of the design process. Some instructors may prefer to divide class time between entrepreneurship topics and the Raspberry Pi while others may want to dedicate entire class sessions to each. Teaching tools that were most helpful for entrepreneurial topics included Alex Bruton's Big Idea Sketchpad exercises, Heidi Neck's *Teaching Entrepreneurship* for class activities, and Diana Kander's *All in Startup* for designing for the customer. The Raspberry Pi Foundation contains labs at various levels to get students acquainted to the platform, regardless of experience level.

Overall, students were drawn to the class for its hands-on approach and for the opportunity to compete in the business-pitch competition. According to course satisfaction surveys, students found the class enjoyable yet challenging. Multiple students commented that the class was a good blend of business and technical skills. Some would have liked more lab time to work on their venture, while others wanted more technical instruction. Out of the three years the class was offered, five students won prize money in the business pitch competition. While the class was deemed successful, further research is needed on the graduates who took this course to determine the impact the course has had on their respective careers.

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THE SHAPING OF HUMANKIND: ETHICS AND CONTROLS IN CYBER INNOVATIONS?

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Keywords: Cyber technology, machine learning, artificial intelligence, autonomous vehicles, ethics, cyber security, virtual reality

ABSTRACT

As invention leaps from the dreams of our predecessors, cyber building blocks are immensely powerful tools embedded with prevailing technology; the creation within cyber innovation is enchanted with new machine learning and autonomous systems rooting into our lives. This paper will examine current rapid advancements in technology, the adoption of artificial intelligence systems, the dependency of technology, and how major ethical theories and practices view these emerging technologies. We will discuss how these technologies and ethics intertwine, and how ethics may or may not guide future applications of these emerging technologies.

This proposed research is relevant for the ever-tightening grip of cyber technology in our world. With new innovations developed every day, the forewarnings of both predecessors and contemporaries should to be considered with the notion of sustaining a balance between understanding ramifications of controlling technology, and needs of humankind. The benefit of this research could bring forward to those in academia, as well as technologists to further explore and investigate the outcomes of adopting technology through the lens of ethics, responsibility, and advocacy.

In this proposed study, the source of data being collected will be through research of literature based on a multi-pronged perspective. The first will explore historic technology development with focus on outcomes of technology adoption and consequence. The second will investigate the latest cyber innovations and capabilities of new modern technology. The third review of literature will focus on an ethics framework relevant to the abundant use of technology and acceptances in our lives.

The literature based on hard science with theorists to metaphoric perspectives of science fiction could help substantiate the notion that technology and innovation may come with consequence. Furthermore, in the development of these innovations, what is the ethical foundation or safeguard is in place to ensure consumer protection.

The implications of this research will be to explore and identify a methodology to become the result of this proposed study. The data review is yet uncertain to make that determination; thereby, results of this study will provide a grounded path of further research.

IDENTITY AND ACCESS FOR SECURED INFORMAITON MANAGEMENT ENVISIONING THE FUTURE

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DESCRIPTION THE STUDY

Identity fraud is an incremental ongoing problem; in fact, it's the fastest growing crime in America, with 9.9 million incidents per year. Identity theft and identity fraud are terms used to refer to all types of crime in which someone wrongfully obtains and uses another person's personal data in some way that involves fraud or deception, typically for economic gain.

Traditionally, the Federal government has relied on Common Access Cards (CAC), Personal Identity Verification (PIV), and user name and password systems. As government settles into the "new normal" of mobile, cloud and other nontraditional access points for applications and other resources, these approaches fail to mitigate the risk.

BASIS OF THE STUDY

Primary source of this study is academic research and study on US government's manuals and practices of US DoD, DHS on Identity, Credentials and Access Management.

Study will demonstrate the practice in government and non-government entities in following aspects:

- Granting access to logical and physical resources
- Developing a comprehensive security policy that addresses all aspects of Identity Management.
- Authentication and Authorization services and provides for realistic opportunites
- Enterprise Single Sign On (eSSO)
- Reliable and Functional Authentication and Authorization process
- Efficent Access authorizatoin and Contrl process
- Testing, Incident & Defect Management, Risk & Vulnerability Management and Audit.

IMPLICATIONS & CONCLUSION

This study will explore the current challenges raised due to technology changes and Identity, Credential and Access Management requirements in government and non-government entities. This study will all also discuss the possible risks of these aspects. Provide the guide lining principles and business rules, authentication and authorization process, Access Management security policy, the paper will also include ICAM Business Process and Access authorization and control process, and Access granting and certification process.

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FACTORS INFLUENCING USER APPS PURCHASE:
AN EMPIRICAL STUDY

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Keywords: Perceived characteristics of innovation, interpersonal influence,   external influence, purchase intention

DESCRIPTION OF THE STUDY

The market of mobile application software has heated up and the numbers of mobile Apps increase rapidly. There are a lot of mobile applications on mobile platforms such as "The App Store" from Apple, "Google Play" from Google, and "Marketplace" from Windows Phone. Portio Research reports that 4.4 billion people worldwide will use mobile applications in their mobile devices in the end of 2017 (Whitfield, 2013). Previous researches about mobile Apps purchase behavior are quite rare. The study focuses on individual users' perceptions of innovation characteristics (Rogers, 1983; Rogers, 1995; Sanni et al., 2013) of mobile apps as explanatory and predictive variables for their purchase behavior. Two specific research questions guided this research: First, can the perception variables of innovation characteristics predict individual's intention to purchase mobile apps? The second research question is whether the international influence, external variables, and price variables are integrated to the purchase behavior model of mobile apps.

BASIS OF THE STUDY

To test the research model, the researchers recruited 200 volunteers on the PTT Bulletin Board System in Taiwan to participate this experiment. Apps are chosen to work on Android and iOS platform respectively in this study. The app types in the study were divided into functional apps and entertainment apps. The app operating systems used in the experiment were Android and IOS. Based on the two (functional versus entertainment) by two (Android versus IOS) experimental design, each participant was randomly assigned into one of four groups (Android-functional, Android-entertainment, IOS-functional, or IOS-entertainment). Each group included 50 participants.
The researchers selected three apps of each type from Google Play and The App Store. Each app had been developed on both Android and IOS at the same time. Functional apps chosen were PAPAGO! Taiwan, English King, and Food Convenience. Entertainment apps chosen were FINAL FANTASY III, Plants vs. Zombies, and Candy Crush Saga. Each subject selected one of the three apps appropriate to his/her group assignment. After reading an introduction to the app selected, the subject completed the questionnaire. At the end of the experiment, 200 copies of the questionnaire were distributed; of those, 197 copies of completed, valid responses were collected. The constructs of reliability and validity of the instrument were evaluated. Stepwise regression enters independent variables into the regression equation one at a time, starting with the independent variable that best predicts the dependent variable.

CONCLUSIONS AND IMPLICATIONS

The research results show users' perceptions of interpersonal influence and price of Android-functional apps influence purchase intention. The perceptions of relative advantage and compatibility of IOS-functional apps are positively related to users' purchase intention. Users' perceptions of complexity, interpersonal influence and external influence are related to purchase intention of Android-entertainment apps. Users' perceptions of complexity and interpersonal influence affect purchase intention of IOS-entertainment apps. Besides, users' perception of interpersonal influence is the significant factor to influence the Android-functional, Android-entertainment and IOS-entertainment apps purchase intention. Based on this understanding, mobile apps programmers and apps platform managers can determine how to improve the users' purchase intention and actual behavior.

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WHAT IS THE STATE OF HIGHER EDUCATION CYBERSECURITY PROGRAM NEEDS WHILE FACING DIMINISHED STATE APPROPRIATIONS?

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ABSTRACT

Early college access to cybersecurity education is complex with multiple causal and mediating factors that govern access for different groups and individuals that we refer to as "neglected minorities." There are few studies that focus on the flow of these neglected minorities through the cybersecurity education pipeline. This paper presents preliminary findings and research implications aimed to understand how state appropriation funding and diminishing funds in low-income state funded higher education universities effectively dimensioning faculties ability on outreach in communities. Overall the research aims to create an understanding or correlation of understanding about the diminishing funding that effect university programs in cybersecurity centered domains. Additionally, the findings about diminishing state appropriations highlight how universities will need to seek aid and funding to continue or develop help for future students ascertaining careers in cybersecurity.

Keywords: Cybersecurity, mobile security, higher education, training, diversity

THE POLITICAL MASTERY OF TWITTER:
EXPLORING CONTEXT COLLAPSE THROUGH SOCIAL MEDIA

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ABSTRACT

Coined by Wesch (2008; 2009) into popular parlance, "context collapse" refers to an infinitely possible online audience contrasted to the limited groups a person normally interacts with face-to-face. According to Facebook (Efrati, 2016; Statista, 2016), the negative underpinnings of "context collapse" were publicly exposed as the decline of personal and original online content sharing tantamount to user confusion, loss of meaning and less participation. Nevertheless, one US political figure discovered how to operationalize social media risks resulting in highly beneficial rewards. We examine the construct and mastery of "context collapse" through the influential Tweets of President Donald J. Trump. The President's 2016 campaign, victorious election, and subsequent 2017 nascent governing strategies incorporated unparalleled use of "context collapse" through Tweets of obfuscation, contradiction, alternate facts, diversion, spin, course correction, information glut, media manipulation, and an unprecedented grip on his audience. Twitter became the President's preferred social media; therefore, we argue that "context collapse" is not merely a social construct or term of art, but an influential online tool engaged by power-brokers. This panel explores "context collapse" within a non-partisan open-minded discussion of political influences and consequences manifested through the mastery of Twitter technology.

Keywords: Context collapse, Twitter, information glut, manipulation, obfuscation, diversion

PANEL DISCUSSION

This panel discussion focuses on two questions: 1). How did President Donald J. Trump use social media "context collapse" for professional benefit and personal gain during the 2016 election cycle and beyond? - *and* - 2). Why did the general US citizenry ("prudent common sense adult men and women") become so enamored, engaged, and influenced by the pre- and post-election Tweets of President Trump? To address these questions, we will illustrate the construct of "context collapse" by applying it to the Twitter feed of the 2016 US election Trump campaign and the subsequent 2017 governing Tweets posted by the 45th American President. Then we will introduce our results from fourteen interviewees and a six-member focus group sampling of adult Twitter users and compare those limited statistics to published professional polls. Our intent is to explore the outcomes of Twitter political messaging and the respective successful or failed tactics of messaging to an infinite global audience of disparate income, age, gender, nationality, ethnicity, class, employment, party-affiliation, and interest in social media. Universal access to digital mobile technology provided a social media leveler and balance that offered no shortage of opinions, beliefs, convictions, and judgments blurring the boundaries between American backgrounds, socio-economic classes, and any perceived workplace or personal injustices. Our mission was to better understand how the Twitter success of President Trump favorably manipulated "context collapse" to his benefit, when Facebook could only recognize "context collapse" to its detriment. The panel will also discuss the following rationales and outcomes gleaned from our limited sample size data collection.

- Political Twitter Accounts. Adult US voters were amused, entertained, and committed to the political Twitter accounts of politicians, primarily the Tweets of Donald J. Trump. Expressions of trust, loyalty, naiveté, and belief vs. skepticism, disgust, outrage, and disbelief, were collected at an approximate 51-49% data level. Despite their polar opposite opinions, 69% admitted they were addicted to the Tweets and could not disengage the Smartphone or turn off the news.
- Context Collapse. 78% of the interviewees and focus group members never heard of "context collapse," so the construct was explained using the Facebook example. The majority of the sample size admitted difficulty in focusing on the most outstanding or interesting Trump Tweet of the day for more than one evening

because an even more outrageous Tweet or social media announcement replaced it. Within a 24-hour period, context was lost ("collapsed") and so was a distinctive memory of the original Tweet.

- Manipulation, Diversion, Obfuscation, Contradiction. Trump Tweets were often so unconventional, unrestrained, and occasionally lacked all propriety, that it was easy to be diverted to another Trump topic, viewpoint, or contradictory position. At times, subsequent Tweets obfuscated the first message and the reader couldn't recall the original Tweet's intent or purpose. Several focus group members agreed that a Trump Tweet on Monday was easily replaced by the Tuesday Tweet, etc., and by Friday's Tweet, little recall of the earlier Tweets were available. This was especially disconcerting to Twitter followers who felt they needed a score card to keep track of what may be very important information, but soon forgotten due to the overwhelming Tweets of various contradictions and/or completely new topics.

- Information Glut and Time. The sheer volume and intensity of political social media overwhelmed voters and dominated the news. By election time, many voters were saturated with the events and merely wanted the process to be over and their lives back to a relative normalcy. Some interviewees admitted that by November 8th, political platforms were completely forgotten and replaced by catchy slogans (i.e., Make America Great Again; America is Good), and votes were merely cast by loyalty to one candidate or party over another. A majority of our sample size (86%) opined that media normalcy did not resume following the inauguration.

- Sample Size Comparison to Professional Polls. Interestingly, the sample size voting record deviated little from the national professional polls; however it is important to note that our study participants were all from a large publicly-traded US global corporation in Southwestern Pennsylvania (PA). In the 2016 Presidential Election, PA voted Republican by 0.05%; and Allegheny County voted Democratic by 16.5%.

Our panel will synthesize these various sample group perspectives to present how adult American voters in Southwestern Pennsylvania interpreted President Trump's Tweets in terms of their understanding and perceptions of "context collapse." We will argue that manipulation, obfuscation, diversion and contradiction of political Tweets by the same poster reversed the negative connotation of "context collapse" to a positive beneficial and rewarding enterprise for a politician who mastered the Twitter tool. Furthermore, we will also consider the future acceptability of deliberate Twitter "context collapse" and whether or not it may become a respectable social media tool and modus operandi for political operations. We will then open the floor to audience discussion and opinions; and solicit areas of interest to provoke further study.

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APACHE BIG DATA ECOSYSTEM: AN EXPLORATORY ANALYSIS

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ABSTRACT

We have reviewed the history and the academic and industrial advances on the development of Hadoop systems using the documentations available at http://www.apache.org and many research papers in ACM and IEEE publications. Our findings will help both academic and industrial communities have a better understanding of Hadoop ecosystems and their potential impacts on the economy.

Keywords: Hadoop, Apache Project, ecosystem, big data, analytics, economic impacts

ACCOUNTING STUDENTS' ACCEPTANCE OF E-BOOKS:
AN APPLICATION OF UTAUT

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ABSTRACT

Many organizations make considerable gains from the worldwide growth of the use of electronic books (e-books). The question arises as to which factors may influence accounting students when considering e-books. This study uses the unified theory of acceptance and use of technology (UTAUT), which benchmarks eight different models related to the IT acceptance, as theoretical bases from which to identify factors that may influence accounting students' acceptance of e-books. The results show that many of the hypotheses were found to be significant. Surprisingly, perceived ease of use did not have a positive impact on any factor as anticipated in the hypotheses. Perceived ease of use has negative impacts on perceived usefulness and attitude toward e-books. This suggests that because of the analytical knowledge required in accounting, accounting students found e-books impractical when solving problems or completing assignments, whereas students in other fields considered e-books easy to use and useful.

Keywords: Acceptance of e-books, perceived usefulness, perceived ease of use, and attitude toward e-books