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INFORMATION SYSTEMS EDUCATION JOURNAL

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Where do Student Outcomes Begin? Developing Professional and Personal Management Skills as a Strategy for Student Success in the First Computing Course and Beyond

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Abstract

Through the annual ABET assessment process, Computer Information Systems faculty in the College of Business at a regional institution were able to diagnose problems regarding students not satisfying our program's Student Outcomes. Often, the impediments to student success were not technical in nature and prompted faculty to consider non-technical solutions. A framework for the interaction and interdependency of the technical and non-technical skills, termed the "Blue and Green Curve" is presented that describes balancing emphasis on the technical curriculum (Blue Curve) and professional and personal management skills (Green Curve) that have the potential to accelerate students' acquisition of technical skills. The framework prescribes a foundation of effective habits to establish early in a student's academic career. Guided by this framework, changes to a freshman-level programming fundamentals course in the CIS program are described. Pedagogical tools with assignments and rubrics that support the curriculum changes are shared. These changes, among others factors, may have contributed to a 10% increase in the freshman persistence rate over a two semester period.

Keywords: student outcomes, programming fundamentals, computing course, student success, technical pedagogy, and professional skills

1. INTRODUCTION

There remains ample evidence that the demand for jobs in the Information Technology sector - for systems analysts, database administrators, software developers, web and mobile developers - remains high (Burns et al., 2014). In fact, the U.S. Bureau of Labor Statistics (BLS) continues to forecast growth in the 2010 to 2020 timeframe, despite challenges to enrollment in computing-related majors in the US over the last decade. While fulfilling this demand is certainly within the capabilities of programs in Computer Information Systems (CIS), attracting students into our programs is only the beginning; retention, development, and successful

matriculation are often the real challenges. Our programs and curricula must produce successful outcomes that lead to a fruitful career in the computing field where lifelong learning and growth are the hallmarks and objectives of our graduates' careers.

When students fail to satisfy learning objectives, what should the institutional response be? DuFour (2004) proposes the institutional responsibility is to intervene preemptively rather than to apply remedies. He also proposes that the solution directive should be required of the student, not an optional invitation for help. Intervention requires timely identification of students who may need additional resources.

This paper presents a qualitative reflection of why students were failing to meet certain technical learning objectives in an undergraduate CIS degree program. First, we examine the role of habits for student success; Next, we use the results of ABET program assessment to diagnose students' lack of proper habits as contributing to failure in the first programming course. We then propose a balance between learning professional and personal management skills and technical skills.

IT technical skills are easily identifiable through adoption of ABET specific learning objections, which include programming and system design competencies. Yet there is concern that students may not be instilled with the professional skills necessary for success in development careers. Professional skills can include communication, problem-solving, critical thinking, teamwork, learning, time and resource management, interpersonal, and intrapersonal (Candy et al., 1994; Guthrie, 1994; Mayer, 1992).

We posit that the lack of professional skills in undergraduates, particularly time management, can hinder the acquisition of the technical learning objectives causing a two-fold negative consequence. We propose a solution approach that describes changes made in our program in the introductory programming class. We also consider the implications of our solution approach as they pertain to ABET-accreditation and AACSB accreditation, as our CIS program is shaped by both. We close with future research and empirical directions to balance two learning curves - that of personal and professional development (maturity) and that of technical competency.

2. DIAGNOSING THE PROBLEM

The ABET and AASCB processes prescribe establishment of specific learning objectives, regular objective assessment, and faculty reflection for how to improve the attainment of the objectives. At our regional college of business, a significant portion of the students are first-generation college degree seekers, from minority groups, or both. Subsequently, due to a number of these factors, not all of our students are ideally or optimally prepared for college. Our ABET and AASCB assessment processes have corroborated this under preparedness for college-level work and reveal ineffective learning habits: a lack of self-organization skills, an inability to envision and adequately plan for future possibilities, and a propensity to retreat from challenges and adversity. We accept that these are also challenges faced in other institutions over the last decade or so (Elliott et al, 1990; Rendon, 1995; Wise, 2008).

Reflections Using Multiple Sources

Our diagnosis of poor habits among our students was drawn from four sources: interviews with students corroborated with consultation among faculty, ABET assessment data, and feedback from employers and Industrial Advisory Board members. Feedback from these sources suggested the need for an intervention. We discuss each data source to better illustrate the problem.

Reflections From Interviews With Students

In our program, the faculty meet with students at least once during the semester for advising. During these discussions, we become familiar with the students and assess their goals. As a result of this process, we have detected some troubling trends. Often, students couldn't articulate well-defined career goals or a defined plan beyond selecting which courses to take next semester. Furthermore, they relied solely on faculty to recommend courses rather than making a plan themselves. Additionally, students rarely participate in internships and had inadequate resumes (if they possessed a resume at all).

As a department we gathered empirical evidence describing several symptoms correlated to the lack of performance by students, particularly those students who were receiving poor or unsatisfactory scores. As an example of the close ties our professors have to the student facilitating observations, we describe that two of our professors interview the students in each course taught. Another professor regularly

interacts through a technology club and a web development club. And all professors are involved in formalized student advising each semester.

Symptoms include: a lack of time management and no use of a calendaring system, no predefined study times except for athletes who have required study hall hours, lack of propensity to seek help from the professor, the tutor, or fellow students, working (i.e., employment) too many hours preventing time to work on assignments, no career plan or idea of what they want to do with their degree even as graduating seniors.

Reflections From ABET Assessment Outcomes

Our AACSB and ABET assessment and evaluation activities include student outcomes evaluation to determine whether our students are performing at a satisfactory level. When student outcomes are not met, we identify and ameliorate the causes with corrective action. As some of our ABET student outcomes were unsatisfactory we discovered a "missing data" problem: students were failing to submit their assignments. We approached this as behavioral issue that must be addressed in order for learning to transpire.

Our solution was to focus on our programming fundamentals class, taught predominantly to freshman. As example one course learning objective is to create an application using the Input->Process->Output programming paradigm which is mapped to our ABET Student Outcome 1: "An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution." In the Spring of 2014, 23% of the students (7 out of 31) scored unsatisfactory on the assignment. This is a poor result that runs dangerously near the 30% threshold set by our program for acceptable levels of poor and unsatisfactory performance. In this case, only one student of the seven failing students actually submitted an assignment. As educators, we must address the need to develop an entirely different skill set that was the course material calls for; we must also visit the skill set that develops the internal "compass" where submitting assigned work is accepted as part and parcel of success. While we could meet this reality with indifference, this is behavior we can ill afford to abide. We hold this position for two reasons: 1) Information Systems programs continue to suffer from low enrollments for a variety of reasons of the last 15 years (Granger et al., 2007; Burns et al., 2014); and, 2) the skills CIS graduates possess remain highly valued among the employers.

Reflections From Employers And Advisory Board Members

Our ABET process includes regular meetings with our program's industrial advisory board members. Some of these employers also collaborate with us by hosting projects for students to complete in our capstone systems development course. When we asked these stakeholders what skills they desire from our students, they included the following items beyond the expected technical skills:

1. Ability to collaborate and work in teams.
2. Time management skills and ability to deliver on time
3. Critical thinking to solve business problems
4. Ability to communicate well orally and in written form

We then compared our student outcome goals to the list of desired skills for employers and found some deficiencies. For example, historically we have used group projects in several courses as a mechanism to foster collaboration and teamwork. However, upon reflection, the college does not teach about how to be successful in small group collaboration. Further, our assessment of collaboration skills was limited to end-of-project peer; this is not sufficient as effective collaboration skills should be taught earlier. We also found that the other courses in the business curriculum were either not explicitly teaching these collaboration skills or covering them later in the curriculum cycle. However, employers were telling us that they valued these personal management skills as much as technical skills.

Research questions

The assessments and reflections led us to develop the follow research questions.

1. Besides technical skills, what other professional skills are needed by our students to prepare them for successful careers?

2. What frameworks and tools might be useful to include in teaching non-technical skills to students?

3. Where should these skills be taught? At the beginning, middle, or end of a student's academic career?

4. What results have been observed from experimenting with different educational treatments?

This paper shares our findings in hopes that other universities experiencing similar problems can implement some of the same solutions.

3. FRAMEWORK FOR INCREASING MET STUDENT OUTCOMES

As it became clear that some of our students lacked the habits to transition successfully to college-level work, our approach was to "put first things first." We started with our introductory programming course, as it is oriented towards freshman. Focusing on freshmen is the appropriate first step as it is well documented that the first-year experience is generally challenging (Clark, 2005). Our solution approach draws upon the lessons of Covey's (1997) seven effective habits. For instance, on the point of self-organization, Covey (1997) calls for taking a proactive stance as an effective habit. Commensurate with Covey's admonition to "begin with the end in mind," we found that freshmen demonstrated great difficulty with prioritization.

Going Beyond the Technical

With a few exceptions, ABET's Student Outcomes (SOs) are technical or analytical in nature. In Appendix D, we list how we have adopted ABET's Computing Accreditation Commission's SOs ***a*** through ***i***, plus the ***j*** outcome SOs in our CIS program. A clear majority of these SOs are technical or analytical and are assessed with assignments that require the design, development, testing, and implementation of technical artifacts. Other SOs specifically address analytical skills, such as writing a paper or reflecting on ethical considerations. Several other SOs, however, require communication skills (typically classified as a soft-skill) and collaboration within a team.

Given the stated objectives of the employers participating in program's Industrial Advisory Board the "life" skills are not fully "captured" within ABET's SOs. In order to meet our SOs, we as faculty must make up the difference. Underdevelopment or lack of these "soft" skills could impact the student's ability to perform on-time and to meet real-world project objectives.

As we reflected on these deficiencies in our students, we identified two sets of skills worth distinguishing. Notionally, we have labeled growth and development in the acquisition towards mastery of technical skills as the "Blue Curve." Correspondingly, we labeled the arc of progress in the acquisition and mastery of the non-technical skills as the "Green Curve." The "Green Curve" includes skills such as time management, study habits, prioritization, goal seeking, drive/motivation, management of risk/failure, continued personal and professional development outside the classroom, etc.

We theorized that the time spent on focusing on Green Curve skills early in a student's education, with continuous reinforcement throughout the curriculum, could develop the personal traits needed to succeed in acquiring technical skills (to ascend the Blue Curve). Our resolve was to spend more time helping students acquire Green Curve skills earlier in the program as a strategy for greater success in acquiring blue curve skills (technical skills). We propose that early care in the Green Curve may accelerate the acquisition of Blue Curve due to the students' successful habits.

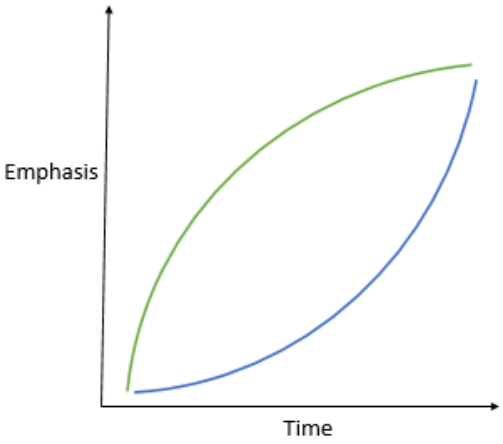

Figure 1. The Blue and Green Curve Model Towards Mastery. The green curve is the upper curve in this figure.

Figure 1 demonstrates the simplicity of the concept. The ***y*** axis represents a scale suggesting the amount emphasis and time spent on either Blue or Green curve skills. The ***x*** axis correspond to progression through the curriculum, from freshman through to graduation. While the model may be presented in an oversimplified manner for parsimony, the Green Curve is emphasized earlier so that benefits of Green Curve skills can help them acquire technical (Blue Curve) proficiency later. With the early acquisition of Green Curve skills, we propose that professors can expect higher performance in technical areas in later years. Of course, we do not entirely present this idea as

original. The First-Year Experience movement in higher education has long suggested that a focus on adapting and forming the correct attitudes and habits be accepted as a pre-cursor to rigorous engagement in discipline-oriented study (Upcraft and Gardner, 1989). Furthermore, this idea has been promulgated within the CIS educators (Saulnier et al., 2006).

Covey's Transitions

Our Blue Curve/Green Curve model is consistent with how Covey (1997) describes the relationships and transitions among the seven habits. In keeping with Covey's model, the Blue and Green Curves should lead to Interdependence (see Figure 3). For our students, interdependence blends proficiency in leadership, business acumen, and continuous improvement in technology.

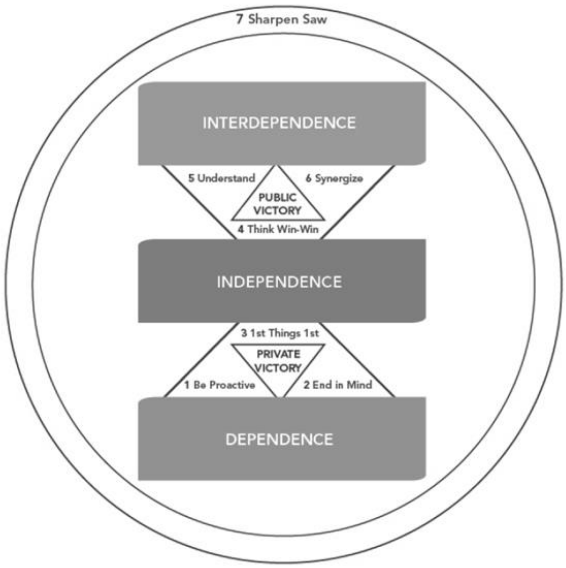

Figure 2. Covey's (1997) Transitions

Covey's (1997) model provides a notional guide for milestones in student achievements both the Blue and Green Curves. As freshmen/sophomores, students develop independence with the basic habits(Figure 3). Achieving the basic habits is a "private victory" in that it enables their own self-organization and orientation. This independence will be required for success in upper-level coursework and electives. It is our desire that this leads to "public victories" such that students engage in extra-curricular and co-curricular activities designed to further elicit progress on the Blue Curve. In relating our Blue Curve/Green Curve to Covey's model (Figure 3), we reflect the role that non-technical soft skills play towards mastery and success in our program and in the discipline. An ultimate test of the efficacy of this approach is reflected in Covey's (1997) seventh habit: to "sharpen the saw." Our aim is to develop self-motivating and self-sustaining professionals who embrace the change and challenge inherent in the discipline. We presume that these curves move on indefinitely in the process of Covey's seventh habit.

Challenged to Transform

Covey's (1997) transformation model (Figure 2) is also useful when we consider the context and situation of our own institution: our implicit and tacit mission is to effect a transformation in those students who have not been given a fuller set of opportunities to develop successful habits. Our challenge in a rural and regional institution is take students who, on a scale of 1 to 10 in terms of college-preparedness, who are at the 2 or 3 level and elevate them to the 7 or 8 level. Early Green Curve emphasis gives us better options and probability of later success.

Thus far, we have witnessed some success with our Blue and Green Curve model. Recent graduates had entered our program with marginal Green Curve skills, and subsequently progressed along both curves to great success. We have graduates in major metropolitan IT markets making six-figure salaries within a few years of graduation who are living examples of our "take them from 2s and 3s to 7s and 8s" perspective. Of course there are outliers. We have 4.0 honor students who, either innately or through other means, have the Green Curve in hand and progress superbly on the Blue Curve without truly needing us. We also have students who, for whatever reason, can't or won't respond to any of our interventions and treatments and ultimately fail and/or choose something other than higher education. Given our program's context, the Blue and Green Curve model is particularly useful for reaching what we call the "middle cohorts" - those for whom we would most able to effect transformation and for whom careful attention to the curves matters (Babb et al., 2014).

Who is responsible for ensuring students learn effective habits?

While our conclusion about soft skills and personal management skills were justified, we found these conclusions somewhat problematic to implement. In a technical program, whose responsibility is it to teach non-technical skills such as time management, goal setting, etc.? At

the university level, freshmen often have a - required, first-year experience course to teach students how to be academically successful . At the college-level similar courses have also recently been introduced. However, at the University level these courses were inconsistently coordinated and the observed symptoms still remained. Anecdotal feedback from students suggested that these University-level courses were "blow off" classes that they don't learn much from. At the College level, some good courses in business communication and finance were offered to also address the "soft" and "life" skills, but they do not weave our discipline's Blue Curve. Also at the college level, a management course does reading of Covey's (1997) material, but this course is typically not taken untill the junior or senior year. Additionally, this exposure was only in one class and not systematically reinforced or emphasized. Thus, the "cure" was too little too late.

Since the number one reason for our unsatisfactory ABET SOs in the introductory course according to non-technical problems, we elected to deal with the problem directly at the start of our own curriculum. For student success, we had to add Green Curve to our program curriculum at the earliest possible time, in the introductory programming course; waiting for others to solve the problem was too risky. We are also accountable and responsible to all of our constituents – to students and to the employers of our students – to act.

4. CASE STUDY

This section of the paper will outline the various tools we used to implement blue and green curve into our curriculum. We'll discuss the tools by course, but nothing prevents the adoption of these tools throughout the curriculum or the insertion of other ideas and solutions. The goal is to increase Green Curve earlier into the curriculum so that students can benefit maximally throughout their academic experience. And, the goal is to have students take both the acquired blue and green curve skills into the workplace.

Green Curve's Learning Objectives introduced in the Beginning Programming Course

The technical course learning objectives for the beginning programming course focus on the acquisition of HTML, CSS, and JavaScript coding skills and is intensely hands-on with daily learning activities and assessment through project assignments.

To introduce Green Curve skills, students had several reading assignments from the book 7 Habits of Highly Effective Personal Workbook by Steven R. Covey. The personal workbook was chosen over the full-text version of the book for three reasons: 1. It is a faster and easier to read, 2. It focuses on taking action not just reading, and 3. The workbook is also used in a junior level business management course and we desired to leverage multiple exposures to the same principles.

Specific Learning Objectives:

The specific green curve learning objectives have been inserted into the beginning-programming course and describe student outcomes as abilities. The Specific Learning Objectives are listed in Appendix E.

Several of these learning objectives were incorporated into an assignment called "Career and Life Portfolio" which focuses on habits 1, 2, and 3 of Covey's 7 Habits of Highly Effective People tailored to academic success. See Appendix C for instructions and grading rubric used with this portfolio.

Three lectures were added to the course schedule to discuss the 7 Habits of Highly Effective people with reading assignments from the 7 Habits of Highly Effective personal workbook. Lectures consisted of student giving short oral presentations over the habits, discussing the habits in small groups and as a class, and doing a few of the personal exercises in the workbook. Emphasis was placed on the Career and Life Portfolio assignment as it manifests the habits in tangible form. What is provided in this paper and in the appendices is just a sample of our implementation.

Blue Curve Changes to the Beginning Programming Course

In five years of ABET assessment and reflection on this course, the professors who taught the course emphasized the replacement of multiple-choice exams with projects demonstrating skill acquisition. Quiz and multiple-choice questions are still used, but are less prominent and used to reinforce terminology and definitions. The projects include creating a multiple page website using HTML and CSS and a JavaScript-based application demonstrating implementation of an input, processing, output paradigm. The results were an incremental improvement in ABET outcomes and an increase in the cognitive-level of demands in the assignment.

The following section showcases several tools used to introduce coding or to practice coding through hedonic experiences. The authors have no affiliation with the applications showcased but have used each in the programming fundamental courses to enhance learning and motivate students' practice of logical thinking.

Learning Activities: Daily lectures culminated in several learning activities created by the instructor to practice the specific learning objectives lectured upon. Lectures were limited to 20-30 minutes of the course and then students performed hands-on learning activities that practiced what was just lectured on or expanded into related learning objectives.

Weekly Calendaring Exercise: Each week students had to demonstrate the use of a calendaring system that identifies a month's worth of academic deliverables and the dates due and pre-planned study times. Students were required to record the due date of each deliverable for all courses, not just the programming fundamentals course. Students were also required to define pre-planned study times for one week in advance.

For two weeks the professor quickly graded the calendars, which were brought to class. This was to ensure students were following directions; many had errors or deficiencies in defining pre-planned study times only putting a day to study, not a specific time to start and end times. After two weeks, students graded each other's calendar with the professor randomly checking calendars. This started the week the professor discussed Habit 3, putting first things first, and continued the rest of the semester.

Through the ABET-prescribed annual assessment process, the usefulness of this exercise was discussed and will be replicated in the remaining three intermediate to advanced programming courses, giving consistent exposure from the freshman experience through the senior-level capstone project. Anecdotal evidence suggested that some students internalized the exercise and have continued using the calendar with deliverables in their work environment. The details of the calendaring exercise are outlined in Appendix F.

Finding the Right Tools

Ultimately, the green curve is also designed to facilitate acceleration along the blue curve. In this first programming course, several tools have greatly assisted in realizing our goals for the course. A detailed explanation of each tool, and how they are used, is outlined in Appendix G.

5. DISCUSSION

Returning to the research questions presented in this paper, we share the following conclusions from our investigations and reflections.

RQ #1. Besides technical skills, what other professional skills are needed by our students to prepare them for successful careers?

For employers, industry advisory board members, and faculty observations regarding non-technical deficiencies that hinder our students achieving the ABET student outcomes, we conclude that the non-technical skills are critical to include throughout our technical program. Desired skills are time management, prioritization, career planning, goals seeking, taking responsibility for one's actions, collaboration, effectiveness in small teams, etc.

For example, the number one reason for unsatisfactory levels of achievement in ABET student outcomes came from students failing to turn in the assignments. Teaching more technical skills won't resolve this problem. Teaching prioritization and time management has a greater chance of helping these struggling students.

RQ #2. What frameworks and tools might be useful to include in teaching non-technical skills to students?

A valuable framework is the 7 Habits of Highly Effective People by Steven R. Covey, which emphasis being proactive not reactive, beginning with the end in mind (e.g., goal setting and problem decomposition), putting first things first, (e.g., prioritization and time management), think win-win for mutual beneficial solutions, seeking first to understand before being understood (e.g., listening and communication), synergy through teamwork, and sharpening the saw (e.g., continual learning and improvement, especially outside of class and in their professional careers).

RQ #3. Where should these skills be taught? At the beginning, middle, or end of a student's academic career?

In our college of business, students are introduced to the 7 Habits of Highly Effective People in a principle of management course. However, the introduction is brief, focuses on

comprehension of the 7 habits rather than the acquisition of the habits, and students typically don't take the course until their junior year, which is too late to benefit from the skills in their critical years as freshman and seniors.

Since our department is ABET accredited, and since the failure to achieve student outcomes was not due to technical knowledge, and since failing to achieve a student outcome can jeopardize our accreditation, we determine it was our responsibility to teach these professional soft skills. Relying on the university or another department to fix the non-technical problems were too risky.

To help communicate to fellow colleagues and administrators our ideas, we created a framework called the green curve and blue curve. (See Figure 1). The green curve represents soft skill such as those from 7 Habits of Highly Effective People. The blue curve represents the technical skills, as outline in our adoption of ABET Student Outcomes and current technical curriculum.

The framework prescribes emphasizing green curve skills early in a student's academic time, even at the expense of deemphasizing some technical criteria to make room in the course schedule. The framework also prescribes that as a student progresses through their academic career, the amount of emphasis on green curve can be reduced since they have demonstrated green curve skill acquisition through rubrics. Because of the increase in these green curve skills, students can have an accelerated blue curve emphases and hopefully learn more technical skills that would have been possible without the acquisition of the green curve skills.

In later years, green curve skills are switched to other skills that may be of benefit, such as job interview skills, creation of a technical portfolio useful in job interviews, acquisition of internships, leadership, and team effectiveness, professional oral presentations, etc.

Earlier in this paper and in the appendices, we are pleased to share the tools, assignment and rubrics that we are experimenting with to achieve the green and blue curve skills.

RQ #4. What results have been observed from experimenting with different educational treatments?

It is too early to describe the full effect of the strategy we've outlined in this paper. Future assessment cycles, prescribed by AACSD and ABET processes, will help elucidate the achievements. However, some early indications are available. Our university has a freshman persistence rate of 63%. Increasing this rate is a top priority of university administrators. Since the inclusion of the green curve assignments into our programming fundamentals course, the persistence rate for two semesters has been 72% (N = 39)and 73% (N = 32). The first semester course was taught in a computer lab on-the-ground. The subsequent course was taught online learning objectives and tools, e.g., Cloud 9, codehs.com, etc.).

Both semesters were taught by the same professor with three student-led lecture days on 7 Habits of Highly Effective People, career and life portfolio assignment (see Appendix C), and a weekly assessment of using a calendaring system to pre-plan study times and identify school deliverables. It is a difficult attribute causality behind the results as there was not a positivist design to the treatments. The results could be attributed to many non-treatment factors, but some portion of the increase could be attributed to emphases on green curve skills. Take the results as indicative of potential success and that each college should evaluate which assignments and rubrics to implement in which courses.

We recommend a technical program evaluate their students for the attainment of green curve skills and reflect on if the acquisition of green curve skills might increase the achievement of technical student outcomes.

6. CONCLUSION

ABET and AACSB processes prescribe annual assessment on specific learning objectives. Through these reflective processes, we discovered patterns in students failing to satisfy objectives. The reasons were non-technical. A framework for interweaving instruction of the technical and non-technical skills, termed the "Blue and Green Curve was implemented. This framework describes balancing emphasis on the technical curriculum (Blue Curve) and professional and personal management skills (Green Curve) that have the potential to accelerate students' acquisition of technical skills. The framework prescribes a foundation of effective habits to establish early in a student's academic career. Guided by this framework, changes to a freshman-level programming fundamentals course in the CIS program are described. Pedagogical tools with assignments

and rubrics that support the curriculum changes are shared. These changes, among others factors, may have contributed to a 10% increase in the freshman persistence rate over a two semester period.

7.REFERENCES

Babb, J., Browning, L., Womble, L., & Abdullat, A. (2014) Designing a Student Mentor Program For Engagement and Retention in a College Of Business at a Regional Institution. Proceedings of the 2014 Clute Institute International Academic Conference, March 16 - 18, San Antonio, Texas (USA)

Biggers, M., Brauer, A., & Yilmaz, T. (2008, March). Student perceptions of computer science: a retention study comparing graduating seniors with cs leavers. In *ACM SIGCSE Bulletin* (Vol. 40, No. 1, pp. 402-406). ACM.

Burns, T. J., Gao, Y., Sherman, C., Vengerov, A., & Klein, S. (2014). Investigating a 21st Century Paradox: As the Demand for Technology Jobs Increases Why Are Fewer Students Majoring in Information Systems? *Information Systems Education Journal*, *12*(4), 4-16.

BLS (2014). U.S. Bureau of Labor Statistics. www.bls.gov. Accessed June 30, 2014.

Candy, P., Crebert, G., & O'Leary. (1994). Developing lifelong learners through undergraduate e-education. *Report to the NBEET*. Canberra, Australian Government Publishing Service.

Clark, M. R. (2005). Negotiating the freshman year: Challenges and strategies among first-year college students. *Journal of College Student Development*,*46*(3), 296-316.

Cohoon, J. M. (2002). Recruiting and retaining women in undergraduate computing majors. *ACM SIGCSE Bulletin*, *34*(2), 48-52.

Elliott, T. R., Godshall, F., Shrout, J. R., & Witty, T. E. (1990). Problem-solving appraisal, self-reported study habits, and performance of academically at-risk college students. *Journal of Counseling Psychology*, *37*(2), 203.

Gorgone, J., Davis, G. B., Valacich, J. S., Topi, H., Feinstein, D. L., & Longenecker, H. E. (2003). IS 2002 model curriculum and guidelines for undergraduate degree programs in information systems. *Communications of the Association for Information Systems*, *11*(1), 1.

Granger, M. J., Dick, G., Jacobson, C. M., & Van Slyke, C. (2007). Information Systems Enrollments: Challenges and Strategies. *Journal of Information systems education*, *18*(3), 303-311.

Guthrei, B. (1994) Graduate labour market survey*. Report for the Department of Education Employment and Training*. Canberra, Australian Government Publishing Service.

Mayer, E. 1992. Key competencies. *Report to the Australian Education Council and Ministers for Vocational Education, Employment, and Training*. Canberra, Australian Government Publishing Service.

McCambley, W. (2014). Top Ten Computer Science Engineering Schools. *Codehs.com*. June 11.

McDowell, C., Werner, L., Bullock, H. E., & Fernald, J. (2006). Pair programming improves student retention, confidence, and program quality. *Communications of the ACM*, *49*(8), 90-95.

McKenzie, W. B. (2006). Information Systems Curriculum Revision in a Hostile Environment: Declining Interest, Threats from Offshore, and Proprietary Certification. *Information Systems Education Journal*, *4*(105), 3-8.

Mishra, S., Draus, P., Caputo, D., Leone, G., Kohun, F., & Repack, D. (2014). Gender Rationales and Success Factors in Assessing and Selecting a Major in Information Technology at the Undergraduate Level of a University Program: A Focus Group Approach. *Information Systems Education Journal*, *12*(4), 40.

Peckham, J., Stephenson, P., Hervé, J. Y., Hutt, R., & Encarnação, M. (2007). Increasing student retention in computer science through research programs for undergraduates. *ACM SIGCSE Bulletin*, *39*(1), 124-128.

Rendon, L. I. (1995). Facilitating Retention and Transfer for First Generation Students in Community Colleges.

Saulnier, B., Brooks, N., Ceccucci, W., & White, B. A. (2006). Learning Communities in Information Systems Education: Developing the Reflective Practitioner. *Director*, 07.

Sheskin, D. J. (2003). *Handbook of parametric and nonparametric statistical procedures*. crc Press.

Topi, H., Valacich, J. S., Wright, R. T., Kaiser, K., Nunamaker Jr, J. F., Sipior, J. C., & de Vreede, G. J. (2010). IS 2010: Curriculum guidelines for undergraduate degree programs in information systems. *Communications of the Association for Information Systems*, *26*(1), 18.

Wise, B. (2008). High schools at the tipping point. *Educational Leadership*,*65*(8), 8.

Zuegel, D. 2012. CodeHS Aims to be Market Trailblazer for Pre-College Computer Science Education. *The Standford Review*. December 4.

Appendix A. List of Life Ambitions exercise

Learning Objective:

1. The student will be able to create a list of life ambitions (e.g., what do you want to learn, acquire, accomplish, places to visit, etc.)

Activity: In class, read or paraphrase to the students the following purpose that motivates the exercise.

Purpose: There is story told about a NASA astronaut who when he was 16 or 17 years old he made a list of all the things he wanted to do and accomplish in his list. The list includes many things, including being an astronaut. He'd check off the items as he accomplished them. Habit 2 of 7 Habits of Highly Effective People is "Begin with the End in mind" Creating a list of life ambitions is designing where you want to be, who you want to become, and what you want to have accomplished. At a later time, you can use this list to select specific goals to work on that are in alignment with your long term goals.

Instructions: Make a list of 20 to 30 life ambitions. Make a list, not a paragraph so you can see each item independently of the other items. The following questions can help prompt ideas. Don't judge the ideas or decide how you will accomplish them. For now, just list them and get excited about them. For several of your ambitions, add photos to motivate and visually remind you of the ambition. Search the internet for photos that may visually describe your ambitions, e.g., if you want to go to the Great Wall in China, find a travel photos and paste it in the document. Even though this is for personal use, be sure to record the URL of the photo and give credit to the owner of the photos. Keep this list with you for years to come and set specific goals to help you accomplish your ambitions.

"Begin with the End In Mind" Steven Covey 7 Habits of Highly Effective People

What are your life ambitions? What do you want to accomplish? Consider what you want to accomplish in 1, 5, 10, 20 years that will make your life meaningful and fulfilled. Use this activity to dream. Do not limit your dreams. Do not consider how or when it will be done. Write everything you desire to do, learn, and accomplish. Consider the following questions and write, write, and write.

1. If money and time were not obstacles, where would you want to visit, go to, see, explore, etc.?
2. What things do you want to learn? (Languages, skills, sports, hobbies, etc.)
3. What things do you want to earn, buy, acquire, donate to, etc.?
4. What do you want to participate in, accomplish, win, race, experience, etc.?

Grading Rubric

Criteria	Highly Ambitions	Low Ambition
Beginning with the End in Mind	□ 20 to 30 life ambitions have been listed □ The four questions have been answered with some life ambitions	□ Fewer than 10 ambitions □ At least one question does not have ambitions listed
Visual Appeal	□ Ambitions are in list form not in a paragraph □ At least 5 photos were added corresponding to ambitions □ Credit was given to the intellectual property owner of the photos identifying the URL of the photo and, if possible, the owner's name.	□ Wrote a paragraph rather than a list □ Fewer than 5 photos were added (demonstrating lack of attention to details) □ Credit was not given to the intellectual property owner

Appendix B. Career Interview and Reflection on Career Preparedness

This is a multi-part assignment to cause you to reflect on what you want to do as a career and how best to prepare for it.

Part A:

Find online3 job titles *in your chosen disciplines* and range of salaries for those jobs. Consider using indeed.com or other websites. What qualifications are needed? Are any technology qualification mentioned? What is the salary? Include this data in a 4-column table when you write your reflection for Part C.

Job Title	Qualifications Required	Technical Qualifications Required	**Salary (if available)**
1.			
2.			
3.			

Part B:
Find someone in your discipline and interview them, asking questions similar to these but not limited to these.

1. What do they do? What are their responsibilities or tasks? What is a typical day like for them?
2. What technologies/hardware/software do they use?
3. What would technology or software would they like to know that would make them better as a professional?
4. Any other question that would help you understand their job and the desirability of it to you?

Part C:
Write summary of the information you found through Parts A, B and C. Maximum of two pages (spacing doesn't matter), and a minimum of two paragraphs. Grading will be on evidence of your effort and reflection of what you found. This is your life. You'll get out of it what you put into it.

Deliverable:

Deliver the MS Word document or PDF document to WTclass…\Lessons\Turn In Homework\Homework Career Interview\.

Questions and Answers:

What format should the info be in table or paragraphs?
Several of you have asked if the format of the paper should be in tables or written paragraphs. The format isn't as important to me as the synthesis and reflection on the data you gathered. Some parts lend themselves to present in a table; other parts lend themselves to writing. You choose how you want to present it.
Part A can be in table format or paragraph format. I'm also looking for a synthesis of the data you gathered. The instructions asked some thought provoking questions regarding what you found out, e.g., Can you apply for the job yet? What general skills and what technical knowledge do you need to learn in the next year to be able to apply? Are there any certificates or licensing requirements? How are you going to get experience is they say "8 years experience required"? etc. The Part B (interview) lends itself to paragraph writing also as it is a synthesis of the interview.

Writing is a process of thinking: gathering data, reflecting on the personal meaning of the data you gathered, interpret the knowledge in the data, and then communicating that new knowledge. I want

this to be a valuable learning activity for you that will change your behavior in the next year or two before you graduate---so that you will be stupendously prepared for your careers.

Can we work together on the assignment?

Yes and no. You may do Part A and B with a partner. I encourage collaboration and discussion. But Part C must be written by yourself.

Grading Rubric

Criteria	Excellent	Satisfactory	Unsatisfactory
Part A Job Opps	☐ 3 job opportunities are identified with qualification requirements	☐ 1 jobs identified	0 jobs identified
Part B Interview	☐ A professional was interviewed Interview consisted of the following: ☐ Questions relating to job responsibilities, typical day, what they do, etc. were asked. ☐ Questions related to the technical or software requirements		Failed to ask questions regarding job responsibilities Failed to ask questions regarding technical requirements
Part C Written Reflection	☐ Evidenced provided for *reflecting* on Parts A ☐ Evidenced provided for *reflecting* on Part B	☐ Completed Part A but did not reflect or apply to themselves ☐ Completed Part B but did not reflect or apply to themselves	Missing evidence for Part A Missing evidence for Part B
Mechanics	☐ Length is sufficient to demonstrate reflection and application to the student's life ☐ Length is no more than two pages ☐ Free from distracting grammatical errors, syntax errors, or rambling.	☐ Too short to demonstrate reflection and application. Leaves more questions than it answers. ☐ Length is longer than 2 pages ☐ More than two grammatical errors are distracting.	Appears as if the student vomited thoughts onto the paper with no reflection or coherent structure.
Total Points			

Appendix C. Career and Life Portfolio

Task

Demonstrate that you have improved your professional and personal management skills and learned something from this course besides programming (i.e., the Seven Habits of Highly Effective People). Create a physical portfolio that demonstrates the personal leadership skills you possess or have learned. Create a section (Chapter divider) for the learning objectives listed below. Be creative in presentation! There is no limit to what you can do to present your portfolio, other than it must be tangible and carry-able.

Not all solutions to business problems require technical solutions. The following non-technical learning objectives will be explored in class. Create a tangible portfolio that includes evidence of completing each learning objective listed below.

Learning Objectives:

Students will be able to….

1. Communicate a clear vision of life and career opportunities, including short and long-term goals. (Habit 1: Be proactive and Habit 2 Begin with the end in mind.)
    a. List of Life ambitions, including photos of many of your life ambitions
    b. At least three specific goals, using the template patterned off the goal-setting worksheet Seven Habits of Highly Effective People provided by Dr. Humpherys
    c. Add a page on quotes and life maxims that are motivating to you or significant to you and help you succeed.
2. Outline a specific career plan through college that explores desired career options that leads to students fixing a specific career outcome
    a. Create a list of classes you can take for your college major for each semester until you are graduated. This is a plan (Habit 2: Begin with the end in mind). It is not set in stone and may change in the future. But demonstrate you have a plan, fill in classes, even electives or possible electives, for every semester until you graduate.
3. Demonstrate time management skills and good study habits -- replacing ineffective habits with desired and effective habits
    a. Provide a copy of your calendar with pre-defined study times, school deliverables (homework and exam due dates), and pre-planned fun time.
4. Demonstrate an increased usage of the Student Success Center and other on-campus resources
    a. Provide evidence that you have used one of the resources of the Student Success Center (career counseling, job & internship opportunities, mock interviews, writing center, math lab, physics lab, resume workshop, resume consultation, academic advising, etc.). Evidence can be a summary of something you attended or a photo of yourself in the success center activity, or a signature by a councilor or tutor on something, etc.
    b. Provide evidence that you have integrated yourself into WT college life. For example, take photos of yourself at the activity center climbing the rock wall, bowling, or at some campus event, concert, fine arts event, classroom or labs you frequent, attend a club, attend a sorority or fraternity event, etc. College life is more than just studies, it's a cultural adventure. Instead of photos you can also write about how you've integrated yourself into college life. If someone were to ask you, "So what are you doing at college?" you could show them this chapter and give evidence of all the exciting fun things you are doing and learning in college.

5. Samples of your deliverables demonstrating your website and programming skills. Include at least 3 samples of technical project or technical creations you have done in or as a result of this class. Consider including your homework (particularly homework 4 website and homework 5 Javascript application) or learning activities.

Deliverable
Bring your tangible portfolio to class on the day specified on the schedule.

Grading Rubric

Criteria	Excellent	Satisfactory	Unsatisfactory
1. Communicate a clear vision of life and career opportunities, including short and long-term goals. (Habit 1: Be proactive and Habit 2 Begin with the end in mind.)			
List of Life ambitions, including photos of many of your life ambitions	☐ A prospective employer would be impressed with the quantity and thoughtfulness that went into listing your life ambitions and would say "This is someone who knows what they want in life" ☐ Several images are provided as visual reminders of their ambitions.	☐ A teacher would say, "They put in enough effort to satisfy the assignment but not enough to make it really meaningful and useful to their future." ☐ Two or fewer images were included.	☐ No ambitions listed
At least three specific goals, using the template patterned off the goal-setting worksheet Seven Habits of Highly Effective People provided by Dr. Humpherys	☐ One goals set ☐ Goal is stated in the positive and present tense ☐ Template was used and filled out ☐ Goal is measurable ☐ Goal has a due date ☐ He/she has listed compelling reasons for the goal using the template	☐ Goal is stated in future tense not present tense ☐ Goal is too broad, not measurable ☐ Did not use the template provided and therefore is missing important elements of goal setting	☐ No goal set
Add a page on quotes and life maxims that are motivating to you or significant to you and help you succeed.	☐ One page of positive quotes and life maxims provided ☐ Visually appealing	☐ Half page of content	☐ No pages
2. Outline a specific career plan through college that explores desired career options that leads to students fixing a specific career outcome			
Graduation plan	☐ Create a list of classes you can take for your college major for each semester until you are graduated (e.g., executable plan) ☐ Elective are specific and	☐ Courses listed but not by semester (not a plan, just a checklist) ☐ Electives are	Not present

	not ambiguous	ambiguous ☐ Incomplete timeline	
3. Samples of your deliverables demonstrating your website and programming skills.			
Include at least 3 samples of technical project or technical creations you have done in or as a result of this class.	☐ Three samples provided	☐ Less than three provided	None present
4. Portfolio Organization			
Chapters	☐ The chapters are easily distinguishable	☐ Hard to find items	Items are or disorganized
Grammar & Style	☐ Free from distracting grammatical and typographical errors	☐ A few grammatical errors present	Disregard for quality of grammar
Effort and Proactive	☐ Evidence of thoughtfulness and proactive effort put into the assignment to make the career portfolio a useful life-planning tool ☐ Has visual appeal Is of a quality that demonstrates time and effort and could be presented to a prospective employer or scholarship evaluation	☐ Some effort demonstrates ☐ Evident this was created by a student and not presentable to anyone else ☐ Appears to go through the motion to check off the required boxes but not to make if a purposeful life planning tool.	Demonstrates lack of effort beyond satisfying minimum requirements

Appendix D. The Student Outcomes for CIS Program

These Student Outcomes (SO) were adopted by our department from ABET student outcomes, with the addition of SO#8 and SO#9.

SO1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
SO 2. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
SO 3. An ability to use current techniques, skills, and tools necessary for computing practice
SO 4. An ability to apply knowledge of computing and mathematics appropriate to the discipline
SO 5. An understanding of processes that support the delivery and management of IS within a specific application environment
SO 6. An ability to analyze the local and global impact of computing on individuals, organizations, and society
SO 7. Recognition of the need for and an ability to engage in continuing professional development
SO 8. An ability to function effectively on teams to accomplish a common goal
SO 9. An ability to communicate effectively with a range of audiences
SO 10. An understanding of professional, ethical, legal, security and social issues and responsibilities

Appendix E. Specific Green Curve Learning Outcomes for the First Programming Course

1. Communicate a clear vision of life and career goals, including short and long-term goals. (Habit 1: Be proactive and Habit 2 Begin with the end in mind.)
    a. Deliver brief oral presentations to fellow students regarding Habits 1, 2, 3, or 7.
    b. Discuss with fellow students what they learned from the readings on Habits 1, 2, 3, and 7.
    c. Write reflective answers to a set of questions from Habits 1, 2, 3, and 7 in the personal workbook
    d. Create a list of life ambitions (e.g., what do you want to learn, acquire, accomplish, places to visit, etc.) (see Appendix A for instructions and rubric)
    e. Set three detailed goals (using a modified template from the personal workbook)
    f. Practice achieving short-term goals (using a 5-day Tiny Habits program developed by Dr. BJ Fogg. http://tinyhabits.com)
    g. Discuss with an IT/IS professional about his/her career and how to prepare for it (see Appendix B)
    h. Watch code.org videos on why everyone should learn coding and what a coding career looks like
    i. Tour a local data center and ask two questions to the host Chief Information Officer
2. Outline a specific academic plan through college that explores desired career options that leads to students fixing a specific career outcome with semester by semester, actionable plan for courses to take.
3. Demonstrate time management skills and good study habits providing a copy of a personal calendar with pre-defined study times, school deliverables (homework and exam due dates), and pre-planned fun time.
4. Demonstrate an increased usage of the Student Success Center and other on-campus resources.
5. Provide evidence of integration into college life and campus or learning community activities.
6. Create a portfolio of at least three technical projects that can be used for an entry-level job interview or internship interview.

Appendix F. Details of the Calendaring Assignment

The following instructions accompanied the calendaring assignment:

"Many studies and experience have demonstrated that when you pre-plan a goal, it gets accomplished. When you don't pre-plan, you lose your way. You will use your calendar to demonstrate and practice time management and project management skills. Put the following on your calendar.

1. When will you study next week? Specifically, what days and what times? This is a promise you make to yourself, not to me.

Poor Answer: "I'll study on Tuesday and Thursday"---Poor because it is not specific enough and distractions will stop you from succeeding.

Poor Answer: 'I don't know because my schedule changes each week.' ---That's the exact reason to pre-plan! You can change it as needed but pre-plan.

Great Answer: 'I will study on Monday at 9pm-10pm; Wed from 8am-10am; Thursday from 8am-10am; Saturday from 8pm-10pm.'

The amount of time you study is determined by your goals. A student desiring an A will put more time than one striving for a C. That you pre-plan specific times is what will be graded, not the amount of time.

2. On the appropriate due date, put all the deliverables (exams, quizzes, assignments, etc.) from each of your courses, not just this course. Do this for at least one month in advance. You do not need to put your class times, as that just clutters your calendar which should focus on helping you deliver your deliverables on time and earn a stellar grade."

Appendix G. A Description of Helpful Tools

Codehs.com

Codehs.com is an online, cross-platform learning system to learn JavaScript and programming fundamentals which provides instant feedback to the student on performance.

Currently codehs.com offers a free module called "Programming with Karel" that covers basic programming concepts such as creating and calling functions, linear execution of code, problem decomposition, recursion, and control structures. The website provides 2-5 minute videos, followed by an exploration of pre-written code, followed by one or two exercises to apply the specific learning objective in a programming challenge. Furthermore, an automated assessment agent provides instant feedback to the student regarding the failure or success of the challenge. The benefit of the automated agent is that the course professor is no longer the bottleneck to students learning using this supplemental resource. For small and short lessons provided by codehs.com, instructor feedback may take a week, with the delay limiting the helpfulness of the feedback. However, the automated agent catches most errors and provides students the opportunity to learn from failure and correct the code. Figure 6 demonstrates a programming challenge and the IDE students use to program; students learn at their own pace. Class attendance is required and 2.5 weeks are dedicated to using codehs.com to learn programming fundamentals. Outside work is usually required for students to complete the exercises.

Teacher tools are also provided by codehs.com and we could monitor the progress, view code simultaneously, and answer questions online. Exercises are graded by the professor as pass, fundamentally passed (i.e., accomplish the challenge but can be improved upon), or fail. Codehs.com assigns points for each passed exercise. For the more complicated exercises that may have multiple solutions, the automatic agent can provide feedback, but a human (professor or TA) must make the final assessment of pass, fundamentally passed, or fail. Solutions and common feedback answers are provided to the teacher. Grading is very quick and not a burden, especially since the teacher replaces lecturing with providing feedback and grading of advance exercises. Course grades for the assignment are simply the percentage of earned points in codehs.com over total points available by Codehs.com.

After codehs.com the course topics resumed with integrating JavaScript into web pages and getting input from a web user and dynamically outputting results to the web page. According to codehs.com, Stanford has used Codehs.com in their computer science introductory course work (Zuegel, 2012).

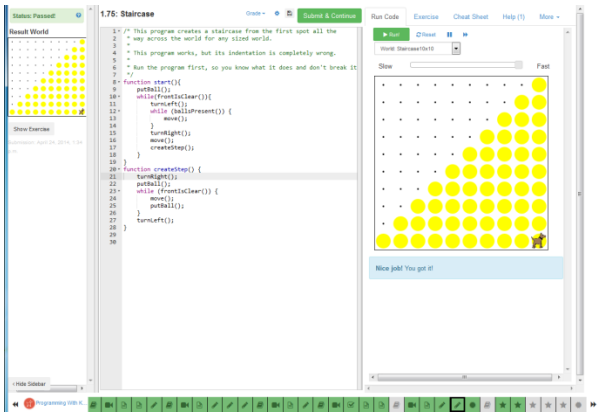

Figure 6. Codehs.com IDE for learning fundamental control structures.

Through course evaluations and informal evaluations students have responded very positively to the inclusion of in-class learning activities and the use of codehs.com, definitely preferring the hands-on exercises over hour-long lectures. Because of the inclusion of daily learning activities and use of codehs.com, the number of coding exercises performed by students increased by 600%, excluding homework assignments which also increased over the ABET assessment cycles. While it is hard to

attribute student outcomes to any one factor, student outcomes did correspondingly improve with the introduction of daily learning activities and codehs.com. Plus the cognitive level of skills increased from simple memorization and syntax error finding in multiple choice exams to producing code that accomplish a mission.

Cloud 9 IDE for web development in the cloud

Cloud9 IDE (http://c9.io) is a professional online development environment for JavaScript and Node.js applications. Students can use the free services for the daily learning activities allowing them to code web pages and JavaScript applications. The advantages over coding web pages with notepad are that the students can resume their work on any computer or at home, web pages are published on the Internet, the IDE gives some feedback to common syntax errors, the IDE file system mirrors a web server file structure, there is an instant preview window, and the professor can collaborate in real-time through the IDE regardless of the location of the students (i.e., online students; see Figure 7). Another advantage of this tool is platform-independence that facilitated Mac users as well as Windows users. The course previously used Notepad++, which was not available for Mac users. Our experience was that the Google Chrome and Mozilla Firefox browsers best supported Cloud9. One downside to the free services is that the workspace environment was occasionally unresponsive because Cloud9 gives server resource priority to paid accounts.

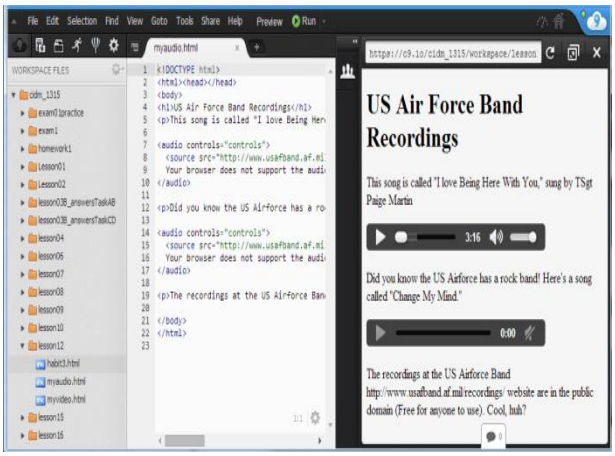

Figure 7. Cloud9 IDE and a learning activity regarding HTML5 audio tag

Hour of Code

We have three business courses that participate in Hour of Code: programming fundamentals, management of information systems, digital collaboration and communications. The purpose is to expose non-majors to the world of coding. Students submit a certificate of completion as evidence for their assignment. Experienced coders can submit something learned from one of the mobile app development tutorials, as very few have mobile app development experience, or participate in an hour of self-directed learning. The purpose is to provide highly motivating positive experiences of non-majors or beginning programmers while introducing them to videos of successful professional coders from Microsoft, Dropbox, Facebook, etc.

In addition we host approximately 700-1000 middle school and high school students at the College of Business throughout the semester and use Angry Birds Hour of Code (code.org) to provide younger students hands-on coding experience. Each visiting student sits at a computer for approximately 30 minute session and codes in the Angry Birds Plants versus Zombie tutorial.

Code.org: http://csedweek.org/learn. Code.org provides several hours-long tutorials and resources for any beginner to learn to code while having fun. They are one of the major contributors to Hour of Code, which introduces millions of students to coding in a one hour session in any course. Code.org features Angry Bird & Plants versus Zombie tutorial for beginners http://learn.code.org/hoc/1 which teaches procedural programming, if else statements, while loops, and problem decomposition in an

hour. It features motivational videos of well-known coders from Microsoft, Dropbox, Facebook, etc. Several other hour-long tutorials are available. Learning objectives are problem decomposition, procedural programming, decision-making control structures, and recursion control structures. Students are not required to type code, but instead drag blocks of predefined code that snap together to create procedures. The block has properties that are customizable. The block-coding technique allow students to focus on the creation and control structures without worrying about syntax errors. While apparently targeted to younger students, even our adult students enjoy this activity as many have never coded before and the challenges get progressively more difficult even for a novice adult coder.

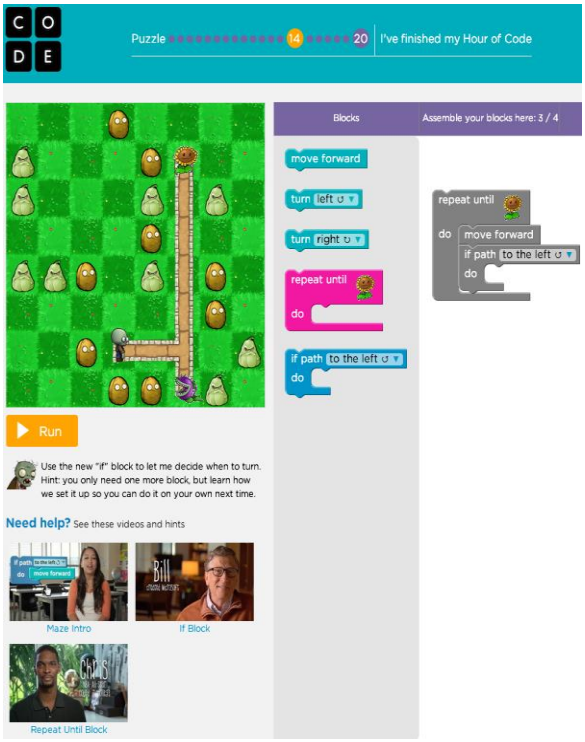

Figure 8. Code.org's Angry Bird and Plant's versus Zombie coding tutorial for Hour of Code participation teaching basic control structures without worrying about syntax errors.

MakeGamesWithUs:https://www.makegameswith.us/build-an-ios-game-in-your-browser/. Students learn to make a complicated game in a free online simulated iPhone. Students type their code in a browser based IDE following tutorial prompts. Knowledge of variables, methods and objects is beneficial.

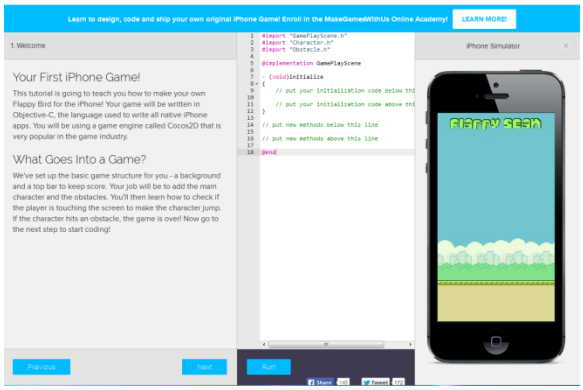

Figure 9. MakeGamesWithUS.us is an Hour of Code option that let students create an iPhone game in a browser.

LightBot Hour of Code: http://light-bot.com/hoc.html
This is a free app for both iPhone and Android devices or playable in a Flash-enables browser. The application teaches procedural logic, recursion, problem decomposition, and use of functions through a hedonic experience (see Figure 9). Students must command a robot through a series of mazes to turn on the lights using predefined procedural options such as move forward, jump, turn left or turn right, and turn on the light. Students report the addictive nature of this app and not wanting to stop. Because of its hedonic nature, this app can be used as an out-of-class assignment to practice procedural programming.

Figure 10. Lightbot Hour of Code is an addictive game to help students experience coding or practice coding to solve logical problem.

The Information Systems Core: A Study from the Perspective of IS Core Curricula in the U.S.

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Abstract

To keep up with technology changes and industry trends, it is essential for Information Systems (IS) programs to maintain up to date curricula. In doing so, IS educators need to determine what the IS core is and implement it in their curriculum. This study performed a descriptive analysis of 2,229 core courses offered by 394 undergraduate IS programs in the United States. The result presents a panoramic snapshot of the IS core in the nation from the perspective of IS core curricula. By mapping those core courses to the most recent IS model curriculum, IS 2010, this study also reports how many IS programs offer each of the seven core courses in IS 2010. Moreover, these core courses were examined from three different perspectives: school type, accreditation, and research orientation.

Keywords: IS Core, IS Curriculum, IS 2010

1. INTRODUCTION

Since the Information Systems (IS) curriculum was founded, it has evolved significantly over the past fifty years (Longenecker et al., 2012). At the same time, IS scholars have been concerned about the nature and scope of the discipline. Benbasat and Zmud (2003) stimulated a passionate debate about whether the IS field is in an identity crisis, and the debate continues (Helfert, 2011; Kohun et al., 2012). Faculty in IS higher education always face a curriculum dilemma: They need to constantly update their curricula in order to keep up with changing technologies and industry trends while struggling to discover the IS identity.

There are generally two essential approaches to the IS curriculum structure: to offer a broad spectrum of knowledge and skills in various required courses, or to take a breadth-first and specialization-second approach in which students are required to complete a set of core

courses in a fundamental body of knowledge followed by a number of electives in a specialized area (Hwang & Curl, 2013). In either case IS educators have to determine what the common core of knowledge is and what the specializations are.

Early IS curriculum models focus on the common core of knowledge, while the most recent IS 2010 curriculum model (Topi et al., 2010) provides greater flexibility by separating the core of the curriculum from career track electives. Because of the wide coverage of information technologies and the constraint of the limited number of units in a program, the separation of core and track electives is considered sound and practical. However, due to the dynamic nature of the discipline, what constitutes the common core of knowledge deserves a periodic examination.

This paper is set to continue the work of determining what the IS core is by examining the core course offerings of the existing IS programs in the U.S. The study intends to present a snapshot of the IS core from the curriculum perspective by referring to the framework of the seven core courses defined in the IS 2010 curriculum model. Furthermore, the study examines the existing IS core from three different perspectives, school type (i.e., public vs. private), accreditation (i.e., AACSB accredited vs. not AACSB accredited), and research orientation (i.e., with a Ph.D. program vs. without a Ph.D. program)

2. Related Literature

Based on Jones's (1997) analysis of the IS literature, two approaches can be used to study IS curriculum: *normative* and *descriptive*. The normative approach seeks to determine factors that affect IS curriculum design and to develop normative standards for the curriculum. Research taking the descriptive approach describes IS courses or programs. The studies in IS core in terms of core subjects or actual courses have basically followed these two approaches.

Normative IS Curriculum Studies

Using the normative approach, the Association for Computing Machinery (ACM), the Association for Information Systems (AIS), and the Association for Information Technology Professionals (AITP) developed and updated large scale curriculum models such as IS 1997 (Davis et al., 1997), IS 2002 (Gorgone et. al., 2002), and IS 2010 (Topi et al., 2010). The IS 1997 and IS 2002 models suggested a standard of reference to IS core topics, while the most recent model, IS 2010, offered guidance to both topics in core and electives. IS 2010 contains the following seven core courses:

- 2010.1 Fundamentals of Information Systems
- 2010.2 Data and Information Management
- 2010.3 Enterprise Architecture
- 2010.4 IT Infrastructure
- 2010.5 IS Project Management
- 2010.6 System Analysis and Design
- 2010.7 IS Strategy, Management, and Acquisition

Many other normative studies (e.g., Maier, Clark, and Remington, 1998; Moshkovich, Mechitov, and Olson, 2005; Golden and Matos, 2006, etc.) proposed that certain knowledge areas or skill sets should be part of the IS core due to business model changes, technological advancements, and job market movements.

Studies using the normative approach have provided a useful reference point for IS curriculum design and development. Although together they represent a best practice model for the content of IS programs, they primarily leave the implementation of the model up to each school. Therefore, the normative studies, in their prescriptive nature, do not reflect the actual image of the IS curricula at large.

Descriptive IS Curriculum Studies

Research taking the descriptive approach views IS as a "socially constructed field" (Lim et al., 2007) constituted and defined by members who can identify themselves as "organizational stakeholders" (Sidorova et al., 2008) of the IS community. From this premise, IS core can be inductively derived from the IS's socially constructed knowledge base embedded in the composition and editorial policies of IS journals as well as the structure of IS curricula designed and developed by IS educators.

Lim et al. (2007), for instance, analyzed the abstracts and titles of 1,197 IS studies in three premier IS journals from 1980 through 2005 to identify the core terms of the field and explored their evolving nature. The study identified eleven field core terms including Information, Organization, System, Model, Process, Management, Data, Decision, User,

Development, and Strategy. Sidorova et al. (2008) also examined the abstracts of research papers published in three top IS journals from 1985 to 2006 and identify five core areas: Information Technology and Organizations, IS Development, IT and Individuals, IT and Markets, and IT and Groups.

As an important stakeholder, the IS educators are likely to closely identify with the IS discipline. IS curriculum reflects an intellectual filtering of knowledge and skill elements by faculty who decide what students should learn for their future careers. Thus, IS curricula authored by the IS educators can also be considered as the stakeholders' reflection of the IS core. Several studies in the last two decades were conducted from this perspective to investigate existing IS core and, in some cases, compared them with IS model curricula.

Maier and Gambill (1996), for instance, collected curriculum data from a sample of 43 out of 108 AACSB-accredited universities in CIS/MIS in the U.S. to identify the most common courses taught. As a result, their analysis identified a profile of typical IS core offerings consisted of courses such as COBOL I and II, Database Management Systems, Data Communications, Data/File Structure, Decision Support Systems, IS project and IS Concepts, as well as Management of IS, Micro-applications, and Systems Analysis and Design. Porter and Gambill (2003) examined the websites of 222 IS undergraduate programs in the U.S. to discover courses required for IS majors and compared them with the IS 2002 curriculum model. Their findings indicated a higher level of alignment between Programming, Database, and Systems Analysis and Design courses, while the alignment between Data Communications, Computer Concepts, Internet, and Micro-applications courses is weaker. In another attempt, Kung et al. (2006) reviewed university course catalogs of 232 IS undergraduate programs in the U.S. and find that the most common core courses include Introduction to IS, Operation Systems, System Analysis and Design, Programming, Database, Telecommunications, and IS Capstone Course. Lifer et al. (2009) also reviewed websites of a sample of 100 IS programs in the U.S to identify the most common IS requirements. The study revealed that Database, System Analysis and Design, Programming Languages, and Networks/Data Communication were the most required IS courses. Stefanidis and Fitzgerald (2010) examined 228 programs form 85 universities in the U.K. and reported the course mapping results according to IS 2002.

In a more recent study, Apigian and Gambill (2010) reviewed curriculum data from websites of 240 IS programs in the U.S. They found that there was a persistent set of core courses that most schools were teaching for the past 15 years. These courses included IS Fundamentals, Database, Systems Analysis and Design, Network Communications, and Programming. As another recent study, Bell et al. (2013) collected curriculum data from university websites and course catalogs of 127 AACSB-accredited IS programs in the U.S. and compared it with the IS 2010 model. The result revealed that IS programs in the nation exhibit a wide range of adherence to the IS 2010 core curriculum guidelines.

Despite the prior work on IS curricula, as acknowledged by Helfert (2011) in a comparative study in IS curriculum, "an ongoing discussion about essential foundations and concepts is required and, due to the dynamics of the discipline, periodical reviews are essential."

3. METHODOLOGY

This study used the university websites as the data source. The use of online information from university websites, such as web-based catalogs, has four advantages: the content is official; the return rate is 100%; the respondent's memory or interpretation is irrelevant; and it is timely and cost-effective. This form of content analysis, as a popular research methodology in the electronic age, made it possible to accurately capture and verify curriculum data (Kim and Kuljis, 2010).

To the best knowledge of the authors, an official complete list of IS undergraduate programs in business schools in the U.S. did not exist. However, a comprehensive list of business and management schools could be compiled from a thorough Google search using such websites as univsource.com, wikipedia.com, allBusinessSchools.com, and so on. On the basis of the identified business and management schools, we used Google search to finally produce a roster of 394 IS undergraduate programs in the United States. These academic institutions all required students to take a set of pre-defined business courses along with either a fixed set of core courses or a set of common

core courses followed by a number of electives in one or more specialization areas to complete the program. Since the purpose of this study is to determine IS core in the United States from the curriculum perspective, we included IS programs both from public and private schools, AACSB-accredited or not.

Using the compiled list of 394 IS programs we performed a content analysis of the websites to identify either their fixed set of core courses or the common core courses as part of their core/elective curriculum structure. Core course data were collected in the period from June to December of 2013. The data items, such as course number, title, and description, were entered into Excel worksheets for the purpose of categorizing, summarizing and ranking. We also developed a Java program to generate analysis results reported in Sections 4.3 and 4.4.

The IS curricula have been widely and effectively used as a standard and comprehensive reference in IS curriculum research. By the time this study was conducted, the IS 2010 was the only model available which offers guidance to both topics in core and electives. Therefore, the course profiling was based on the framework of seven core courses defined in IS 2010. Thus, each collected course was carefully reviewed and, if matched, mapped into one of these seven core courses. Occasionally, multiple courses in an IS program of similar content were mapped into the same IS 2010 core. Further content analysis was performed to categorize those courses that couldn't be mapped into the framework. Finally, statistical analysis was conducted to examine these core courses from three different perspectives: school type, accreditation, and research orientation.

4. RESULTS AND ANALYSES

From the 394 IS programs, we identified a total of 2,229 core courses. The mapping results of these core courses to IS 2010 are reported in Section 4.1. Section 4.2 discusses the courses that couldn't be mapped into any of the seven core courses of IS 2010. Section 4.3 further inspects these mapped courses from three different perspectives – school type, accreditation, and research orientation. Section 4.4 illustrates the distribution of IS programs by the numbers of mapped core courses.

Core Courses Mapped into IS 2010

In Table 1 the "Program Count" column refers to the number of programs that offer a course equivalent to (or mapped into) a core course in the IS 2010 model, and the "% of Program" column refers to the percentage out of the total 394 programs.

Among the seven core courses in IS 2010, *Data and Information Management* is the most widely covered course and is offered in 344 (87.3%) out of the 394 programs. The second most covered course is *System Analysis and Design*, which is taught in 314 (79.7%) out of the 394 programs. In total, 1,407 (63.1%) out of the 2,229 identified core courses were mapped into the seven core courses in the IS 2010 model.

IS 2010 Core Course	Program Count	% of Programs
2010.1 Fundamentals of IS	247	62.7%
2010.2 Data and Information Management	344	87.3%
2010.3 Enterprise Architecture	53	13.5%
2010.4 IT Infrastructure	127	32.2%
2010.5 IS Project Management	261	66.2%
2010.6 System Analysis and De sign	314	79.7%
2010.7 IS Strategy, Manageme nt, and Acquisition	61	15.5%

Table 1. Core Courses of 394 IS programs Mapped to the Core in IS 2010

Core Courses Not Mapped into IS 2010

There are 822 (36.9% of 2,229) core courses from the 394 IS programs that couldn't not be mapped into any of the IS 2010 core courses. On the basis of their course titles and content descriptions and with our domain knowledge, they were further grouped into other nine categories.

As shown in Table 2, 72.6% of the total 394 programs offer a core course in Programming Language. Application Development (35.8%) and Web Development (26.1%) are ranked as the second and the third. Given their content and nature, these three categories are all programming-related in that they either teach a programming or scripting language or apply a language to develop Windows-based or Web-based applications. Although Application

Development is not in the core of IS 2010, the task force of IS 2010 actually acknowledges that this type of course can still be offered as a core course (Topi et al., 2010).

There are 108 courses, such as Emerging Business Technologies, Computer Tools for Management, and Career Planning in Operations and Information Management, which are very difficult to group into a category with a significant group size. Therefore, they were grouped into the "Others" category.

The percentages of the remaining five categories (i.e., Business Intelligence, E-commerce/Mobile, Senior Project, Cybersecurity, and Business Function Oriented) are relatively low. In the IS 2010 model, they are electives and usually offered because of different preferences in curriculum design or diversity in faculty expertise.

Nine Other Categories	Program Count	% of Programs
Programming Language	286	72.6%
Application Development	141	35.8%
Web Development	103	26.1%
Business Intelligence	53	13.5%
E-commerce/Mobile	43	10.9%
Senior Project	39	9.9%
Cybersecurity	31	7.9%
Business Function Oriented	18	4.6%
Others	108	27.4%

Table 2. Core Courses of 394 IS programs Not Mapped to the Core in IS 2010

Mapping by School Type, Accreditation, and Research Orientation

As mentioned in Section 3, there are some different core courses in the same program that were mapped into the same core in IS 2010. For each of the 394 IS programs, after excluding the core course(s) which was/were mapped into the same IS 2010 core, the total number of mapped courses is reduced from 1,407 to 1,238. In this and the next sections, we report results on the basis of the 1,238 mapped courses.

We further inspected the 1,238 courses that were mapped into IS 2010 from three different perspectives – school type (i.e., public vs. private), accreditation (i.e., AACSB accredited vs. non-AACSB accredited), and research orientation (i.e., with a Ph.D. program vs. without a Ph.D. program).

As shown in Table 3, among the 394 programs, 272 (69.0%) are from public schools, while 122 (31.0%) are from private institutes. For the public and private schools, the average numbers of mapped core courses are 3.63 and 3.38 per program, respectively. To see whether there is a statistically significant difference between the two lists of numbers, we ran a t-test and generated a p-value at 0.093. Thus, with a marginal statistical difference, more core courses in public universities were mapped into the core of IS 2010 than those from private institutes.

		Number (% of Programs)	Average number of mapped core course	*p*-value
School Type	Public	272 (69.0%)	3.63	0.093
	Private	122 (31.0%)	3.38	
Accreditation	AACSB	294 (74.6%)	3.55	0.829
	Not AACSB	100 (25.4%)	3.58	
Research Orientation	With Ph.D. Program	50 (12.7%)	3.50	0.709
	W/O Ph.D. Program	344 (87.3%)	3.57	

Table 3. Mapped Core Courses in Three Perspectives

According to its homepage, http://www.aacsb.edu/en/accreditation/, AACSB "provides internationally recognized, specialized accreditation for business and accounting programs at the bachelor's, master's, and doctoral level." AACSB accreditation is regarded as the benchmark for business school quality among the academic community (Burnsed 2011). Among the 394 programs, 294 (74.6%) are from schools that have received AACSB accreditation. In terms of mapping to the IS 2010 core, there is no statistically significant difference (p-value 0.829) between AACSB accredited and Not AACSB accredited schools.

When a school has a Ph.D. program, it can be considered as more research oriented. Since the IS curriculum is the focus of the study, we only look for an IS and IS-related Ph.D. program in a department. Out of the 394 programs we identified a total of 50 which have a relevant Ph.D. program. The analysis shows that there is

no significant difference (p-value 0.709) between schools with a IS or IS-related Ph.D. program (average course mapped at 3.50) and schools without an IS or IS-related Ph.D. program (average course mapped at 3.57).

Distribution of IS Programs for the Numbers of Mapped Core

We developed a Java program to identify the total number of IS 2010 core courses covered by each of the 394 IS programs. Figure 1 shows the distribution of the numbers of the IS programs and the numbers of IS 2010 core course they offer. Note that the X-axis is not for the seven different IS 2010 core courses; instead, it refers to the total number of the mapped core.

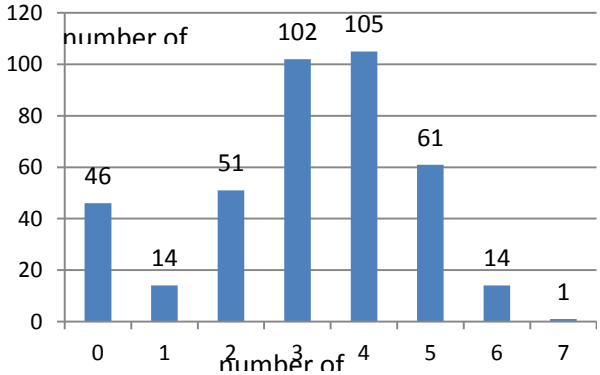

Figure 1. Distribution of IS Programs for the Numbers of Mapped Core

In this distribution, the largest group contains 105 (26.6% of 394) IS programs each of which offers four out of the seven core courses in the IS 2010 model. The second largest group includes 102 (25.9%) programs which provide three of the seven core courses in IS 2010. There are also 46 (11.7%) IS programs not offering any of the IS 2010 core courses and only one (0.3%) program offers all the seven core courses. Only 15 programs offer at least six of the seven core courses in IS 2010.

Overall, the average number of the seven core courses being offered is less than half at 3.14, which indicates that the level of compliance among existing IS programs with IS 2010 is not high. Since the objective of this study is to find the common IS core from the curriculum's perspective, we did not collect any relevant data to explain this gap.

5. CONCLUSIONS

This study performed a descriptive analysis of 2,229 core courses offered by 394 undergraduate IS programs in the United States. The result yields a panoramic snapshot of the IS core of the existing IS programs.

The analyses also report how consistent the existing core courses in the 394 IS programs are with those specified in the IS 2010 curriculum model. Among the seven core course, Data and Information Management is the most widely offered course, while Enterprise Architecture is the least covered core course. In total, 1,407 (63.1%) out of the 2,229 core courses have been mapped into the core of IS 2010.

Moreover, the study examined the mapping between the seven core courses defined in IS 2010 and the offered core courses by the 394 programs from three different perspectives, school type (i.e., public vs. private), accreditation (i.e., AACSB accredited vs. not AACSB accredited), and research orientation (i.e., with a Ph.D. program vs. without a Ph.D. program). We find that in terms of the number of mapped core courses of IS 2010, (1) there is no significant difference between schools with or without AACSB accreditation and also between schools with or without a Ph.D. program, and (2) public universities cover marginally more core courses of IS 2010 than private institutions do.

In particular, the study also examined the distribution of the numbers of the IS programs and the numbers of IS 2010 core course they offer. The result shows that about half of the programs offer three or four IS 2010 core courses. There are 46 (11.7%) of the IS programs which do not offer any of the IS 2010 core courses and only one (0.3%) program offers all the seven core courses. The average number of the core courses of IS 2010 being offered is less than half at 3.14. In addition, there are only 15 programs that offer at least six of the seven core courses in IS 2010.

Lastly, for the 822 core courses which were not mapped into the core courses of the IS 2010 model, we developed nine other categories and properly categorized them. We find that Programming Language, Application Development, and Web Development are the top three course categories.

Using the descriptive approach, this study identifies the IS core in the U.S. that is constituted and defined by IS educators who are one of the important organizational stakeholders in IS as a "socially constructed field". From the curriculum perspective, the panoramic snapshot of the IS core presented in this study helps us understand what the existing IS core is. The data also allows us to compare what the IS core is with what it is recommended to be by using the seven core course framework of IS 2010. We believe that the findings of the study are valuable to all IS stakeholders, such as IS scholars, IS educators, and the practitioners, who are responsible for or interested in IS core design and development.

The IS 2010 curriculum model was used only for its utility as a reference, not its currency and practicality, in this study. One of the future research directions is to study the gap between the core courses being offered in schools and those prescribed in IS 2010. Another possible future study is to examine the relationship between the knowledge and skills taught through the IS core curriculum and those demanded by the industry in order to optimize the IS curriculum to better serve students.

6. REFERENCES

Apigian, C.H. & Gambill, S.E. (2010). Are We Teaching the IS 2009 Model Curriculum? *Journal of Information Systems Education*, 21(4), 411-420.

Benbasat, I. & Zmud, R. W. (2003). The Identity Crisis Within the IS Discipline: Defining and Communicating the Discipline's Core Properties. *MIS Quarterly*, 27(2), 183-194.

Burnsed, B. (2011). Top M.B.A. Programs Embrace Online Education. *U.S. News & World Report*. Retrieved May 16, 2013 from http://www.usnews.com/education/online-education/articles/2011/03/15/top-mba-programs-embrace-online-education.

Bell, C., Mills, R., & Fadel, K. (2013), An Analysis of Undergraduate Information Systems Curricula: Adoption of the IS 2010 Curriculum Guidelines. *Communications of the Association for Information Systems*: 32, Article 2, 73-94.

Davis, G.B., J.T. Gorgone, J.D. Couger, D.L. Feinstein, & Longenecker, H.E. Jr. (1997). IS '97 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems. *The DATA BASE for Advances in Information Systems*, (26)1, 1–94.

Golden, D. & Matos, V. (2006). Introducing the Unified Modeling Language into the Information Systems Curriculum. *Journal of Information Systems Education*, 17(1), 83-92.

Gorgone, J.T., Davis, G.B., Valacich, J.S., Topi, H., Feinstein, D.L. & Longenecker, H.E. Jr. (2002). IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems. *The DATA BASE for Advances in Information Systems*, (34)1, 1–53.

Helfert, M. (2011). Characteristics of Information Systems and Business Informatics Study Programs. *Informatics in Education*, 10(1), 13–36

Hwang, D. & Curl, S. (2013). The Market for Career Tracks in Undergraduate IS Curricula in the U.S. *Information Systems Education Journal*, 12(3), 4-17.

Jones, M. R. (1997). It All Depends What You Mean by Discipline. in Information Systems: An Emerging Discipline? Mingers, J. and Stowell, F. (eds.), McGraw-Hill, London.

Kim, I. & Kuljis, J. (2010). Applying Content Analysis to Web-based Content. *Journal of Computing and Information Technology*, 18(4), 369-375.

Kohun, F.G., Rodi, A.F., & DeLorenzo, G.J. (2012). Does Information Systems Suffer An Identity Crisis? A Case Study of Confusion and Misinformation. *Issues in Information Systems*, 13(2), 328-335.

Kung, M. Yang, S.C., & Zhang, Y. (2006). The Changing Information Systems (IS) Curriculum: A Survey of Undergraduate Programs in the United States. *Journal of Education for Business*, (81)6, 291–300.

Lifer, J.D., Parsons, K, & Miller, R.E. (2009). A Comparison of Information Systems Programs at AACSB and ACBSP Schools in Relation to IS 2002 Model Curricula. *Journal of Information Systems Education*, (20)4, 469–476.

Lim, J., Rong, G., & Grover, V. (2007). An Inductive Approach to Documenting the "Core" and Evolution of the IS Field.

Communications of the Association for Information Systems, 19, Article 32.

Longenecker, B., Feinstein, D., & Clark, J. D. (2013). Information Systems Curricula: A Fifty Year Journey. *Information Systems Education Journal*, 11(6), 71-95.

Maier, J. L., Clark, W.J., & Remington, W.S. Jr. (1998). A Longitudinal Study of the Management Information Systems (MIS) Job Market. *Journal of Computer Information Systems*, 39(1), 37-42.

Maier, J. L. & Gambill, S. (1996). CIS/MIS Curriculums in AACSB-Accredited Colleges of Business. *Journal of Education for Business*. 71(6), 329-333.

Moshkovich, H., Mechitov, A. & Olson, D. (2005). Infusion of Electronic Commerce Into the Information Systems Curriculum. The *Journal of Computer Information Systems*, 46(1), 1-8.

Porter, J. & Gambill, S. (2003). Information Systems Curricula 2003. *The Review of Business Information Systems*, 8(4), 33-40.

Sidorova A, Evangelopoulos, N., Valacich, J.S., & Ramakrishnan, T. (2008). Uncovering the intellectual core of the information systems discipline. *MIS Quarterly*, 32(3), 467–482.

Stefanidis, A. and Fitzgerald, G. (2010). Mapping the Information Systems Currcula in UK Universities. *Journal of Information Systems Education*, 21(4), 391–409.

Topi, H., Valachic, J.S., Wright, R.T., K. Kaiser, Nunamaker, J.F. Jr., Sipior, J.C., & de Vreede, G.J. (2010). IS 2010: Curriculum Guidelines for Undergraduate Degree Programs in Information Systems. *Communications of the Association for Information Systems*, 26(18), 359–428.

A Project Management Approach to Applying Best Practices to Online CS/MIS Experiential Learning Projects

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Abstract

The value of experiential learning projects (which are usually major assessments in courses) in education has been touted since the early 1900s (Dewey, 1938). These projects have the potential to deepen students' understanding of course topics by allowing them to put concepts into practice and watch the results develop. However, experiential learning projects require significant guidance, communication between students and faculty, and direction. Coupled with the communication intricacies of an online learning environment, experiential learning projects become a little more difficult to manage. In this article, the authors examine some of the best practices for teaching online courses as they relate to experiential learning projects, the value of experiential learning projects and then apply a project management approach to addressing the challenges of assigning experiential learning projects in online courses looking at two courses taught at the authors' institution. The authors' then describe some best practices that they have incorporated to better manage the application of experiential learning projects in their online classrooms.

Keywords: Experiential learning projects, Online teaching, Project Management, IS Management course, and CS/CIS and MIS programs

1. INTRODUCTION

The online learning environment has been growing and expanding for a number of years from single course offerings to entire university programs. In turn, the locality of students enrolled in these courses has expanded far beyond the boundaries designed by face-to-face courses. For faculty assigning upper level coursework and projects requiring more instructor hands-on direction or student interaction, the adjustment to the online environment may be a little more complicated. Faculty must find ways for providing an equivalent online learning experience to that of the face-to-face environment.

In this paper, the authors examine some of the best teaching practices for the online environment. They also examine the value of experiential learning projects (a term used here for major assessments in a course) and a project management approach to incorporating such projects into the online setting. The authors also describe some best practices for teaching online learning courses and their application to experiential learning projects using the framework provided by Elbeik and Thomas' Project Management (PM) model (1998).

2. LITERATURE REVIEW

In this section, the authors examine three streams of literature. The first stream focuses upon best teaching practices that can be used in the online environment. The second stream describes characteristics of project management which is applied as a framework later in the paper. The third stream of literature draws from the body of research describing experiential learning assessments.

Best Practices for Project-based Teaching Online

A number of articles have been written on best practices for teaching online courses (Fish & Wickersham, 2009; Keengwe & Kidd, 2010). Several of these best practices should be incorporated regardless of delivery mode such as sequencing projects to build upon previous learning experiences or designing projects that create value beyond the classroom environment (Barrett, 2012).

Kerr (2011: 29) compiled ten best practices for teaching online high school courses that can be applied at any level of education and through different modes of delivery. The tasks in Kerr's best practices are to:

(1) Include multiple sources of content to provide students with a range of perspectives.
(2) Provide timely, thorough feedback.
(3) Provide students with opportunities for choosing their assignment submission medium.
(4) Incorporate opportunities for students to manage their learning process.
(5) Include rubrics for assessment of work.
(6) Include examples of discussion responses or student work.
(7) Create authentic learning experiences.
(8) Have fun with student introductions.
(9) Incorporate social media to decrease isolation.
(10) Ensure students are aware of course technology requirements.

By their nature, online courses have particular characteristics that may need to be addressed to improve the learning experience. The lack of physical presence during communication seems to generate the greatest obstacles in online courses. Thus, faculty should keep in mind that they will need to communicate differently and more carefully when communicating with the class as a whole and with students individually. Faculty must also work a little harder to develop relationships with the students (Dykman & Davis, 2008; Fish & Wickersham, 2009; Wegmann & McCauley, 2009).

Wegmann and McCauley (2009) further emphasized the importance of purposeful communication from incorporating student introductions at the start of the semester to providing personalized emails offering direction as well as encouragement throughout the course. In developing an online course for a master's degree program in education, McCrory, Putnam, and Jansen (2008) tried to design their courses to provide for student interaction with the subject matter, the instructors, and with other students.

Interacting with the subject matter is at the heart of experiential learning projects. Likewise, communicating effectively is essential in conducting effective experiential learning projects, especially in a setting in which communication obstacles already exist. In the next section, the authors examine a project management model that emphasizes the important role that communication plays in projects. This same model can be applied to online courses and the implementation of experiential learning projects, described in section 2. 3, in the online classroom.

Six Stage Project Management Model

The literature reviewed in the previous section emphasized the value of good communication in online classes. Elbeik and Thomas (1998) noted the importance of communication throughout the project management process (Figure 1). Their model consists of five stages briefly defined below:

- The **Define** stage drives the process as the project and key objectives are fully discussed with the stakeholders.
- The **Plan** stage is an ongoing process that may be adjusted as the project unfolds.
- The **Team** members are usually involved with the Plan and Control stages and are led and motivated throughout the project.
- **Communication** takes place at all stages of the project, both formally and informally.
- During the **Control** stage, the activities of the team are monitored in respect of the plan.
- The **Review and Exit** stage consists of a finalizing and evaluation of the project and process as well as an accumulation of lessons learned.

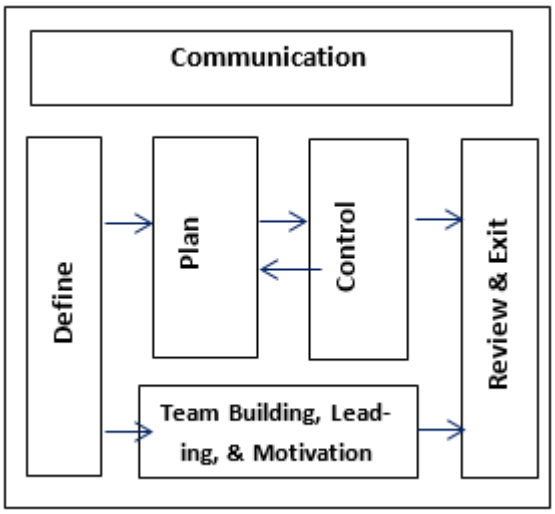

Figure 1 - Elbeik & Thomas (1998), p. 14.

The process may loop and continue as an iterative process for the life of revisions to the project (SME 2. 0, 2012).

Elbeik and Thomas' (1998) model illustrates how strong communication should be applied throughout the life of a project. The model can also be used in the application of experiential learning projects described in the next section.

Experiential Learning Projects

Experiential learning theory has long running roots into research conducted in the early 1900's. Kolb (2005) noted that experiential learning theory is grounded in the work of such noted scholars as Dewey, Lewin, Piaget, James, Jung, Freire, and Rogers. A number of articles have been written regarding the application of experiential learning projects - major assessments in a course - throughout the educational landscape including K-12 programs, community colleges and university settings around the world (Chan, 2012). With experiential learning projects, students are able to visualize the application of course concepts to real world situations and to experience the benefit of their knowledge and skills applied outside the classroom setting.

In 2006, The Royal Academy of Engineering commissioned a study of skill requirements needed by U. K. engineering graduates. From the analysis of over 400 respondents, the researchers found that engineering graduates needed "…technical expertise with practical ability, backed up by strong interpersonal skills…" (Spinks, Silburn, Birchall, 2006: 59). Another study identified project-based learning as a teaching method that would better develop "a capability set including personal and professional development, sustainability, problem solving and decision-making, technical competence (engineering analysis, teamwork & leadership and communication" (Jollands, Hadgraft, Ward, & Grundy, 2005:167)

Experiential learning projects often generate benefits beyond the confines of a single course. In some instances, student projects turn into temporary project implementation jobs or open a door for an internship or part time employment with the client. Students may also be able to use community clients as references or include the project on their resumes.

Sigmon (1979) noted the "reciprocal" nature of experiential learning projects for the student and university as well as the clients. Such projects are capable of generating goodwill for the university (and the client) within the community, promoting the client's name to the campus community, and hopefully gaining insights into the thoughts and opinions of potential customers.

The next section describes experiential learning projects implemented in two different online courses at the authors' institution. The authors describe the projects and the additional steps that they incorporated to accommodate the online learning environment. Several of the steps correspond to Elbeik & Thomas' project management model to facilitate team development, improve communication, assist with implementation and control, as well as finalize the project and review.

3. COURSES

Some of the tasks listed under best practices play a role in preparing the class syllabus. Quite a few of the best practices can be applied in the selection and execution of major assessments that are formulated as experiential learning projects.

This paper examines the application of experiential learning projects in two graduate-level courses offered online to students at the authors' institution. The following section describes the two courses as well as accommodations that were made to address the online teaching environments and encourage project success.

Integrated Decision Support Systems

Integrated Decision Support Systems (BA630) is a core course required of all MBA students at the

authors' institution. The course covers a variety of MIS topics including IT purchasing decisions, infrastructure decisions, project management, change management, data mining, and systems analysis and design concepts. Experiential learning projects have been utilized in both face-to-face and online versions of the course. When community clients have not been found, similar projects are used with written descriptions replacing the interview process.

Group Formation

The face-to-face version of the course is taught in a three hour time block one night a week over the sixteen week semester. The average number of students in the class each semester is approximately 32. During the first week of the semester, students are asked to create groups, for the first project, after an interview-type ice breaker followed by one minute introductions of each member to the class. The face-to-face students are allowed to create their own groups. This approach works well most semesters.

The online version of the course is usually taught over a six-week period during the summer. The same topics and number of exercises are taught as in the face-to-face version. Because the course is taught over an abbreviated time frame, the instructor forms the groups for the first project by noon on the second day of class. Students are asked to introduce themselves to the class using a forum and to complete a personal evaluation of their IT skills by the end of the first day of the semester. The instructor then uses the collected data to form the groups.

Besides questions oriented toward skills associated with the programs to be covered and IT skills in general, the personal evaluation asks for undergraduate major, current employment status, and residency during the course of the semester. Depending upon the make-up of the class, groups are formed, for the most part, based upon the following criteria:

- One person who is located in an international country
- One person who is local and can visit the client and can stop by the instructor's office to ask questions if needed
- One person who is in a different time zone than the college
- One person who has had the instructor before
- One person with significant IT skills/experience

Depending upon the size of the class, the groups are usually limited to three or four students. Thus, students may meet multiple criteria. Based upon the students enrolled in the class, if the instructor is able to easily address the basic criteria, other factors are considered as well. The instructor also tries to group people with similar work ethics as well as career goals, if known. For instance, a younger student hoping to work in the accounting field may be teamed with a student who is currently an accountant to help the younger student network. Remote students who live relatively close to each other are also sometimes placed in the same group in case they wish to work on something together.

There are only two group projects assigned in the six week online course, one assigned during the first week and due by the middle of the semester. One assigned in the middle of the course with a due date closer toward the end of the semester. The first project is a small group project requiring the use of Google Drive and Google Hangouts. Additional tools are suggested such as Trello (project management) and Doodle (meeting scheduler).

MBA Group Project 1

The purpose of the project is to familiarize students with online collaboration tools and to help students get to know each other through working on a small project. This is similar to what was noted in a survey of over 100 respondents who attributed the success of an e-Research project to "…the precedent of trust and respect that had been built by working on prior projects together." (Lawrence, 2006: 392)

The project is written to be completed, for the most part, individually but requiring students to be responsible for different elements and to work together for the submission of the project as a whole. For instance, one person is to take the role of project leader and be responsible for overseeing that the project gets completed and that a folder is created in Google Drive for sharing work. Each of the other students in the group was responsible for creating and overseeing one file to be created in the shared drive. The student groups are asked to create two small word processed documents, one spreadsheet and one presentation. Each group member is asked to research a technology based upon a specific theme and contribute information about their technology to the shared files. The group is also required to meet using Google Hangouts and then write about the experience in one of the word processed documents. The students must evaluate their

group members' performance at the end of the project through a group member evaluation form.

The face-to-face course has a similar project in order to facilitate online collaborative work. Although the students are strongly encouraged to meet completely online, they often complete part of their work face-to-face.

MBA Group Project 2
In the following section, the description of Project 2 is applied to the Elbeik and Thomas' Project Management model (1998).

Teams: Students are allowed to select their own groups for the second group project. However, they must abide by the time zone criteria as described in 3. 1. 1 Group Formation unless approved by the instructor. (The MBA program attracts students from around the world. The time zone criterion is required to prevent significantly varied time zones across groups.) Over the past ten years in which the course has been offered online, most groups have maintained the same membership as assigned for Project 1.

Student groups usually start the second group project a little more rapidly than they started the first project. The second project requires students to work through the system analysis and design process for a community client experiential learning project, when available, or a case study when real clients cannot be found. Most projects focus upon the development of a database; however, during one semester, the project centered on the development of a web site for the community client.

Define: Project descriptions are provided with depth and great detail. Instructional notes and video tutorials have been developed to assist students with unfamiliar materials.

Communication: Most communication among group members takes place via email, text messages, phone, and Facebook. However, more students used Google Hangouts for communicating during the summer 2014 semester than in previous semesters. In addition, most groups used Google Drive for sharing their work; however some used Microsoft's One Drive or Dropbox.

Control: One group member operated as the project manager and took responsibility for overseeing the project, maintaining communication, and seeing that the assignment was submitted on time. The local group member worked on behalf of the group with any meetings that had to be handled face-to-face with the client or obtaining assignment clarification or assistance from the instructor.

Exit and Review: At the end of the project, students are asked to evaluate their team members' performance in the group. If groups have problems, the students are asked for additional detail. On the final test, students are given an essay question in which they describe something that they learned in class that they can apply as future managers. Although they are not specifically asked to focus upon the systems analysis and design project, most of the essay answers describe something that they learned from the project, most often oriented toward project management.

As indicated in the literature review and the project management model, communication is key. Those groups that communicated well were usually very successful in their projects and satisfied with their group work. Some even carried their relationships on to other classes and class projects. Those groups that communicated poorly, and/or lacked strong team leadership, usually performed poorly on the project or the work fell on the shoulders of only one or two members.

Information System Management (ISM)
In this section, we present the analysis for an experiential learning project in a 500-level course that is open to both undergraduate and graduate level students. The Information System Strategy and Management (IS575) course is offered as an elective to both Computer Information Systems undergraduate majors as well as graduate level MBA students. To obtain graduate level credit, the graduate students are required to write an additional term paper (strategic planning report for an organization).

The course has normally been offered in a face-to-face format. However, during the spring 2014 semester, the course was offered online. The majority of the weekly course work centers around topic based research and analysis reports. However, there is one larger project, a consultancy report, in which students work with community clients. This project will be the focus of the next section.

Project 1
Define: In the consultancy report, students examine the IT department and IT services

provided in an organization, either on campus or of their choosing. They are then asked to write a paper describing the organization's IT infrastructure including: hardware, software, networking, security measures, customer support, and IT department management structure.

Teams: The students are allowed to work as individuals or to work in teams of two or three. Most remote students work individually which loses the team project aspect.

Plan: Undergraduate students located on campus are asked to utilize one of the on campus departments for their consultancy report. Students living a distance from campus are asked to use one of their connections for finding a community client.

Controls: One of the problems that the instructor ran into with the project was the lack of control. When the course was taught in a face-to-face format, the instructor would accompany the teams to their first meetings with the clients and guide the students during further work.

Communication: Because the instructor was unable to provide intermediary guidance during the project and the clients were scattered across the country, the instructor was unsure of the actual amount of communication that took place between the students and community clients.

Exit and Review: Peer evaluations were used to evaluate student performance. However, minimal detail was provided by most groups to warrant sufficient evaluations.

In examining the two courses, the authors discovered some project management practices that were used, or should be used, in both courses that can be applied to future online experiential learning projects. These best practices are suggested in addition to those provided in the literature.

4. BEST PRACTICES APPLIED TO ONLINE COURSES

As indicated in the literature review, there are a number of journal articles that describe best practices for teaching online. Here we use the project management framework (discussed in Section 2), to illustrate the application of best practices the authors encountered (Section 2) in their courses.

Define – Course

Course syllabus and policies: To encourage students to read the course syllabus and policy statement as well as familiarize themselves with the online course structure and testing tool, a short quiz over the material was offered on the first day of class. Students could take the quiz up to five times in order to receive a perfect score. Questions focused upon instructor response time during the week, on weekends, and over holidays, locations of help resources, and cheating.

Detailed assignments: Copious details are provided in assignment descriptions to minimize the number of questions and to encourage consistency of work across groups.

Video Tutorials: Instructions and video tutorials are provided for applications and tools to be used during the course of the project.

Plan - Time Management

Military time and consistent deadlines: Military time should be used for deadlines to prevent confusion. Due dates and times should be consistent for project types to help students intuitively know the deadlines. For instance, in the authors' courses, tests were always started on Tuesdays at 8:00 a. m. and closed on Thursdays at 8:00 a. m. , forums were always closed at 23:55 p. m. , and the same for homework assignments and big projects.

Communication - Frequent Communication in Multiple Formats

Frequently Asked Questions (FAQs): FAQs were created for each assignment as well as the course in general. Students were encouraged to post general assignment questions to the appropriate FAQ for everyone to see. Questions specific to the students' particular situation were asked to be sent directly to the instructor via email, text, or voice. To further encourage the use of the FAQs, a response would be posted to the FAQ and then an email would be sent out to the students notifying them of the FAQ question and response.

Weekly Overviews: Each week began with a weekly overview discussing the previous week's graded assignments (including top scores and examples of high quality work) and outlining the homework being assigned that week. Reminders for exercises that had already been assigned, and were not yet due, were also included. For the assignments coming due that week, an estimated date and time for grading completion was also provided. Additional buffer

time was always included in the grading deadline estimate so that the instructor could meet the self-imposed deadline.

Communication for the start of the week: When possible, the Weekly Overviews were made available on the Friday prior to the start of the week. Once the Weekly Overview was posted, the students were sent an email notifying them that the next week's class was available online if they wished to get an early start.

Grading deadline communication: Once the assignment deadline passed, the students were sent an email reminding them when the instructor expected to have the grading completed. If grading was completed early, the instructor would post the grades and notify the students. If it looked like the grading deadline would not be met, the instructor would notify the students in advance of the grading deadline and provide an updated grading deadline estimate. Sticking with deadlines and keeping the students informed practically eliminated communication about deadlines.

Communication of progress: Once the grading of a test or project is completed, the instructor would send an email to the students notifying them that the project had been graded, the gradebook had been updated, where to find the grading feedback, as well as a breakdown of the top scores for the assignment. If the assignment was a forum, the students were encouraged to read particular forums and asked to note specific elements to improve their future work. Letting the students know the top scores and giving them an idea of high quality work has seemed to lessen complaints about grading.

Team Building and Motivation

Group formation: The process for forming groups, as described in section 3 Group Formation, has been utilized for several years in the MBA course and resulted in very successful groups. The authors have considered applying a similar process to face-to-face projects.

Bonus points: Small bonus points were awarded from the start of the class to reward students for exceptional work and extra effort. Students were also made aware at the beginning of the class that bonus points would be awarded for work that went above and beyond the assignments requirements. The instructor has found that the overall quality of course work improves with the early awarding of bonus points.

Controls

Specified clients: Utilizing groups with a mix of local and remote students allowed the instructor to work with a local client on a specific project. This also provided the instructor with control over the quality of the projects as well as interactions with the community client.

Peer evaluations: A detailed peer evaluation form was assigned at the same time as the group project. Knowing that they would be evaluated for their performance in the group seemed to encourage group participation for some of the students.

5. CONCLUSION

In this paper, we discussed the best practices for online teaching and the value of strong communication. Literature regarding the value of experiential learning projects and the application of a project management model to enhance online courses and experiential learning projects were also provided. As the authors implement more experiential learning projects in online courses and utilize more social media tools to enhance communication, new ideas for improving the classroom setting will arise. Project management models provide a framework for classifying and examining these ideas to determine how they can best be applied to projects and the course in general.

6. REFERENCES

Barrett, B. (2012). Virtual Project Management: Examining the Roles and Functions of Online Instructors in Creating Learning Applications with Value. *American Journal of Business Education* (Online), 5(6), 655-n/a. Retrieved July 10, 2014 from http://search.proquest.com/docview/1418447567?accountid=38003

Chan, C. (2012). Exploring an Experiential Learning Project through Kolb's Learning Theory Using a Qualitative Research Method. *European Journal of Engineering Education*, *37*(4), 405-415.

Dewey, J. (1938). Experience and Education. New York: Colliers Books.

Elbeik, S. & Thomas, M. (1998). Project Skills, Oxford, Butterworth-Heinemann.

Lawrence, K. A. (2006). Walking the Tightrope: The Balancing Acts of a Large e-Research

Project. Computer Supported Cooperative Work. The Journal of Collaborative Computing, 15(4), 385-411.

McCrory, R., Putnam, R., & Jansen, A. (2008). Interaction in Online Courses for Teacher Education: Subject Matter and Pedagogy. *Journal of Technology and Teacher Education*, *16*(2), 155-180. Retrieved July 12, 2014 from http://search. proquest. com/docview/200001834?accountid=38003

Dykman, C. A., PhD., & Davis, C. K., PhD. (2008). Online Education Forum: Part Two - Teaching Online Versus Teaching Conventionally. *Journal of Information Systems Education*, *19*(2), 157-164. Retrieved July 12, 2014 from http://search. proquest. com/docview/200158633?accountid=38003

Fish, W. W., & Wickersham, L. E. (2009). Best Practices for Online Instructors: Reminders. *Quarterly Review of Distance Education*, *10*(3), 279-284.

Jollands, M. Hadgraft, R. G., Ward, L. & Grundy, I. (2005). Student Engagement in Project-Based Courses in First Year Chemical Engineering at RMIT University, *Proceedings of the 4th Global Colloquium on Engineering Education* (GC2005), Sydney, Australia.

Kerr S. (2011). Tips, Tools, and Techniques for Teaching in the Online High School Classroom. *Techtrends: Linking Research & Practice To Improve Learning, 55*(1), 28-31.

Kolb, A. Y. & Kolb, D. A. (2005). Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education. *Academy of Management Learning & Education*, *4*(2), 193-212.

Sigmon, R. (1979). Service-Learning: Three Principles. *Synergist. National Center for Service-Learning*, ACTION, *8*(1), 9-11.

Spinks, N., Silburn, N., & Brichall, D. (2006). Educating Engineers for the 21st Century: The Industry View. Henley-on-Thames, Oxfordshire: Henley Management College.

Wegman, S., & McCauley, J. (2009). Going Fully Online: Reflection on Creating and Engaging Environment for Online Learning. *International Journal for the Scholarship of Teaching and Learning*, *3*(1), 1-7.

Assessing Cyberbullying in Higher Education

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Abstract

This project aims to expose information educators to various aspects of cyberbullying for the purpose of policy development in an environment of higher education. The preponderance of nation-wide research on cyberbullying is concentrated on adolescents; such efforts in college campuses are limited to individual endeavors. Cyberbullying research on college campuses lacks a unified definition of the concept. Although the states mandated most school districts to develop and enact some sort of policy, the law is silent on the college level cyberbullying. According to the literature, *cyberbullying* is reserved for adolescents; however, *cyber-harassment* or *cyberstalking* are related to adults. While cyberbullying shares with conventional bullying intimidation, aggression, and harm, it is unique because 1) the encounter is not face-to-face; 2) the perpetrator can employ varied means (e.g., cell-phones, texts, blogs, Internet, social media, etc.), and 3) the act can be undisclosed. The data was collected from a random sample of 511 students (out of a student population of approximately 6,000) in a Midwestern town by employing self-administered questionnaire. It was found that engagement with different social network groups and online communications with those with questionable identity are good predictor of increased vulnerability to the risks of being victimized. The data suggests being victimized leads to victimization. Although males differ from females in terms of the type and the extent of cyberbullying, no significant difference was found among the categories of student status or their class ranks.

Keywords: cyberbullying, cyberstalking, cyber-harassment, IT Policy, assessment

1. INTRODUCTION

The intention in this project is to provide educators in higher education information on the misuse information system that are potentially harmful. One such danger is cyberbullying. Dan Olweus, a Belgian professor of psychology at the University of Bergen in Norway, was the first person who attempted to systematically study bullying in the 1970s (Neves & de Oliveira, 2010). Harmful consequences of bullying (e.g., suicide, death, or injuries) inspired many to pay closer attention to it as a serious issue. Bullying is "peer abuse" (Englander, 2008), which is a form of power imbalance between actors (Olweus, 1993), which results in one (the bully) dominating the other (the victim) by degrading or intimidating through inflicting physical, verbal, and/or psychological harm as an avenue to gain superiority (Donegan, 2012).

Bullying can be found in all types of social environments; and, can be pornographic or sexual, hostile name calling, or *flaming.* Bullying has symbolically kept pace with the advent of information technology and the worldwide use of electronic devices. Hawkins, Pepler, and Craig (2001) have estimated that slightly over 80% of Internet users either have experienced or witnessed electronic (or cyber) bullying. As much as the internet and other forms of communication technology have enabled global interactions, they have equally exacerbated vulnerability to harm either symbolic or via direct interactions (Jäger, Amado, Matos, & Pessoa, 2010). The availability of mobile devices and access to the Internet have provided more

amenable means for communicating forms of verbal attacks (e.g., insult, rumors, name calling, threat) and/or social assail (e.g., intimidation, humiliation, isolation, degradation).

Cyberbullying, similar to face-to-face bullying, is not occasional or accidental; in many instances it is deliberate and continuous. It is not clear who is vulnerable as a victim, but the preponderance of the research is conducted on adolescents; research on cyberbullying in colleges and universities is lagging behind. For example, with the exception of the National Crime Prevention Council, which only explained the nature, definition, and strategies to confront cyberbullying, which also targets adolescents, a national and officially sponsored survey of cyberbullying in post-secondary education has received little attention. Research on collegiate level cyberbullying is also limited (Piotrowski & Lathrop, 2012; Zacchilli & Valerio, 2011); and the findings are diverse. The preponderance of the available information on college students is generated by independent researchers (e.g., Finn, 2004; Molluzzo & Lawler, 2013 and 2012; Smith & Yoon, 2013; Reyns, Henson, & Fisher, 2012; Hinduja, & Patchin, 2007; Walker, Sockman, & Koehn, 2011). Moreover, the diversity in conceptualization might have confused the issue that instances of bullying may not occur on college campuses. These points strongly confirm the need for more research on cyberbullying on college campuses.

Thus, exploring the extent of cyberbullying in colleges is an important endeavor that will contribute to our understanding of the issue more fully, and will help educators identify and prevent these occurrences. Hence, the current study proposes to add to the body of knowledge on cyberbullying by exploring the issue among college aged young adults, their experiences, and their reactive responses to the situation. The purpose is to explore the challenges that college students face when experiencing cyberbullying. This study further intends to inform the audience the elemental variables in victimization risk so that educators and university administrators can provide a safe learning environment for their students.

2. LITERATURE REVIEW

Information technology has transformed information diffusion in an unprecedented manner, both constructively and destructively, with a comfort level that remained vulnerable to misusing or abusing the technology. One of the main reasons for this duality is the Internet's open door that encourages privacy and security issues, and the assumption that *everything goes on the Internet*. Bullying is among the issues that has not been immune to this. The sheer volume of the attention paid to this issue has placed cyberbullying among top legal issues—such as guns and hazing—on college campuses (Gilroy, 2013).

The literature suggests that cyberbullying is increasingly becoming epidemic. For example, a recent Pew project (Pew Internet & American Life Project, 2007) estimated that approximately one-third of all teenagers have been victimized. A parallel finding by the US Department of Education (2011) also verified 1,521,000 such instances that were experienced by adolescents ages 12 through 18 in 2009. The 2011 Youth Risk Behavior Surveillance Survey (Center for Disease Control and Prevention, 2011) also found that "16% of high school students (grades 9-12) were electronically bullied" in the year that preceded the survey. In line with these findings, Spitzberg and Hoobler (2002) also reported that one-third of undergraduate students in their sample were being stalked over the Internet.

There are many reasons for the spread of cyberbullying. For example, Pratto, Sidanius, and Levin (2006) resorted to "social dominance theory" (i.e., discrimination that favors the dominant group) and asserted social dominance in terms of age, gender, and other arbitrary set of systems that act as harbingers for exerting power. Dominance is a group dynamics, a socio-political phenomenon, which is a verification of the disproportionate arbitration or power. In the cyberspace, bullying (or any other type of aggression) may not be explained by Pratto et al.'s theorization since aggression in the cyberspace is an indistinguishable act according to age or gender, therefore leaving the victim with a series of guesswork about the perpetrator's identity. In addition, these authors left out the social class or race issues in their *dominance* equation.

Hoff and Mitchell (2008) have found that cyberbullying among adolescent stems from negative experiences such as bad relationship, break-ups, envy, intolerance, and ganging up. Shariff (2006) saw a pattern of encouraging others to engage in sending the victim a series of persistent messages on a regular basis. When others (e.g., Donegan, 2012; Eslea & Mukhtar, 2000; Hoover & Olson, 2001; Le, 2006) tried to draw parallels between traditional bullying and

cyberbullying, they found more incidents of bullying and physical aggression among males than females; females tend to be verbally reactive (Hoff & Mitchell, 2008). Although there is a significant correlation between cyberbullying and anonymity (Aricak, 2009), female victims tend to reveal their experiences (Li, 2006). Unless the victim has knowledge of the perpetrator, the anonymity of the perpetrator and the lack of physical proximity in the cyberspace hinders physical reactivity by male victims (Baldasare, Bauman, Goldman, & Robie, 2012).

Whether these findings can be generalized to college students is debatable. For example, Chapell et al. have argued that because of the diversity in conceptualization, research findings on cyberbullying behavior cannot be generalized from one setting (e.g., elementary and high school) to another (e.g. College) Hoff and Mitchell's (2008) study of adolescents revealed more instances cyberbullying among White children than any other racial categories; MacDonald and Roberts-Pittman (2010) did not find significant differences in race when the sample shifted to the college-age respondents. Smith and Yoon (2013) also reached similar conclusions regarding the experiences of college students. These studies also suggest that incidents of cyberbullying in colleges may be veiled, and that the maturity level of college students in handling the situation may hinder the actual officially reported occurrences of the events, which may not protect them against tragedies. An issue of concern here is the term "bully," which may convey an adolescent connotation, whereas the situation with adults is characterized more so based on "harassment" or "cyberstalking," which could dilute the issue at hand. Brown (n.d.) claims that college students are more vulnerable to cyberstalking because of the availability of e-mail addresses.

Because cyberbullying is on the rise, some states have enacted laws targeting cyberbullying. State laws, however, lag behind technology. Cyberbullying laws are developed based on the assumption that the existing laws against personal threats and harassment are applicable to cyberbullying (Purusothaman & Rani, 2014). The common thread in these laws is their reference to direct and indirect harm that can be inflicted upon an individual because of employing electronic devices. States that have passed cyberbullying laws mandated school districts to develop anti-cyberbullying policies that would comply with the state and federal laws.

In a summary collection of the state law sponsored by Cyberbullying Research Center, Hindjua and Patchin (2014) evinced that all states (except Montana) and the District of Columbia have enacted "bullying" laws as of February 2014. However, the laws in 26 states do not include the term *cyberbullying* per se; these states have incorporated other terms such as *cyberstalking* or *electronic harassment* interchangeably with cyberbullying. All but three states (Alaska, Montana, and Wisconsin) have included laws that explicitly focus on *electronic harassment* or *cyberstalking*. Thus, the states do not convey a uniform vocabulary concerning cyberbullying; often their contents vary according to whether it is cyberbullying, cyber-harassment, or cyber-stalking. The statutory emphasis is on the mental state of the accused and the reaction of the victim (Fukuchi, 2011). Moreover, according to Hindjua and Patchin (2014), there is no federal law specifically on this issue, but instances of racial, ethic, sexual, religion, and disability harassments are treated as bullying.

A few states (e.g., Idaho, Illinois, and Hawaii) have explicitly mentioned cyberbullying as a form of misdemeanor and punishable by law, but the extent of punishment has not been set by more than forty states. Many states that have specified punishment suggested either extended suspension or expulsion; others gave the school officials more discretion on how to handle such issues. These states also held parents liable to pay $100 in fine—which is ironic given the consequences of cyber-bullying. There are also other forms of reactions: the Mississippi legislature insisted on peer-mediation; Louisiana enacted pay counseling; Tennessee enforced the harshest punishment: up to one year imprisonment and $2,500 in fines for making threats.

Three points are noteworthy in the above content analysis of the law: 1) states have not articulated a uniform legal standard; 2) they do not address whether the state law should include incidents occurring outside of the school compound; and 3) the target audience seems primarily adolescents. This is paradoxical because, according to the Working to Halt Online Abuse (WHOA) Website, approximately 38% of cyberstalking victims in 2013 were between the ages of 18 and 29, which is the age cohort for the majority of college students, which should make the concerns for the cyberbullying/stalking on college campuses more urgent.

Another issue with cyberbullying on college campuses is that many institutions do not have an established Internet violence or harassment policy in place; if such policies exit, they seem lax because of the absence of a mandatory legal punishment. One reason for the absence of cyberbullying policies on college campuses is the absence of a direct mandate in the state law; colleges and universities are not obligated to enact policies in this regard. The tendency for the state to separate itself from the internal affairs of the universities is an old tradition in the U.S. judicial system whereby courts do not impose duties on colleges regarding their students (Barr & Lugus, 2011). This is inconsistent with *in loco parentis* (Barr & Lugus, 2011), which sanctions colleges to protect students based on the knowledge that an injury is foreseeable. The national experiences with cyberbullying or cyberstalking on college campuses point to predictable outcomes, yet the laws are silent concerning the incidents on college campuses.

There are also two other issues that should concern instructors and school officials: 1) the court is ambivalent regarding whether the incidents occur on- or campus off-campus; and 2) "the application of the policy could easily reach constitutionally protected speech in light of the ambiguous nature of the term 'abuse'" (Dryden, n.d.). According to Davies and Lee (2008), US bully or harassment laws are stronger when they are directed to adolescents than to college students; the latter are considered adults. These authors further argue that elementary and secondary school officials enjoy greater power than university officials since college students are legally adults.

In summary, studies of cyberbullying have generated diverse results. Some researchers (e.g., Kowalski & Limber, 2013; Pieschl, Porsch, Kahl, & Klockenbusch, 2013) have perceived cyberbullying as an extension of conventional bullying in terms of the intention to harm; others (e.g., Smith, Mahdavi, Carvalho, & Tippett, 2006) contend that cyberbullying shares with traditional bullying patterns such as intimidation, aggression, and harm; however, it is unique because of anonymity, the perpetrator can employ varied means (e.g., cell-phones, texts, blogs, Internet, social media, etc.), and can be undisclosed. A controversial issue here is the comprehension of the message received by the target—there is always the possibility that a message may be misread and misinterpreted; and that the *bully* may not be aware of offending someone else (Menesini & Nocentini, 2009).

3. METHODOLOGY

Sample and Data Collection

The data was collected from a random sample of 511 students (out of a student population of approximately 6,000) during the Fall, 2013 semester, by employing self-administered questionnaire. Because a sampling list was unavailable, a random sample of the day and the time slots when the courses meet was generated. Classes that met on Monday, Wednesday, and Friday 10:00-10:50 were randomly selected; they constituted the working sample and the data source. Selecting the participants from only this time slot avoided duplicating participation—hence, increasing reliability. The sample was slightly 10% of the theoretical population, which is sufficient enough to warrant reliability (Monette, Sullivan, & DeJong, 2010; Neuman, 2011).

Validity was ensured by piloting the questionnaire on 20 randomly selected undergraduate students. Problematic questions were eliminated; vague questions were modified and rephrased. Statistically significant bivariate correlation ($p \leq .05$) among items reflected internal consistency. The final questionnaire included 32 items that measured demographic information such as sex, class or student status; frequency of using information technology and social network participation; and the experience with cyberbullying (either as victim or victimizer).

The sex composition of the sample is slightly skewed (35.8% males and 64.2% females). However, students are more equitably distributed among the categories of Class Rank (25.7% Freshmen, 28.1% Sophomore, 21.5% Junior, 23.3% Seniors, and 1.4% Other). Also, the sample closely reflects the national patterns of distribution between traditional students (78.9%)—typically 18-24 years of age who enters the university with no delay from high school, may work part-time, is financially dependent on other sources (Deil-Amen, 2011)—and non-traditional students (21.1%).

Theoretical Framework and Hypotheses

Approached to research on cyberbullying is diverse. This does not allow for a universal theory of cyberbullying. Despite the emphasis on demographic factors, the literature is silent on the salient of vulnerability. Thus, this research verifies how technology as a platform for global interactions has exacerbated vulnerability to exposure and harms either directly or symbolically by using any digital communication

devices or the Internet as a means of intimidation, harassment, degradation, threats, or posting hurtful or harmful information about someone else (Willard, 2004). The frequency of using digital communication devices increases vulnerability—i.e., susceptibility to threats and the resulting discomfort or danger. The following hypotheses aim to test the above assumption:

Hypothesis 1. Cyberbullying experiences (whether being victimized or victimizing others) differ according to the sex, class rank, and the student status of the respondents.

Hypothesis 2. Increased engagement with different social network and Internet groups increases vulnerability or the risk of being victimized.

Hypothesis 3. Communicating with those with questionable identity in social networks increases vulnerability or the risk of being victimized.

Hypothesis 4. Victims of cyberbullying are more likely to resort to cyberbullying and become perpetrators.

Variables and Measure

Two additive scales measured the relevance of cyberbullying to college students' experiences: 1) *Cyberbullying Experiences (being victimized)*; and 2) *Attempts to Cyberbully (Victimizing)*. The experience of *being victimized* reflects vulnerability, which is measured in terms of susceptibility to threats and experiences of discomfort due to threats, defamation, and harms. *Cyberbullying Experiences* was measured by a 6-item scale; each reflected an aspect of vulnerability—e.g., whether harassed, received threatening messages and hurtful posts, and was intimidated via receiving phone calls, texts, and/or e-mails. Chronbach's *a* for this scale was .71, which ensures reliability. 2) *Attempts to Cyberbully* was also measured by 5 items. The survey questions focused on: sending negative or hurtful texts, posting negative information, and posting or texting threats of physical harm. Chronbach's reliability test for this scale was .67. Although not a cause for concern, items in this scale were cross-checked for internal consistency via bi-variate correlation analysis—all were statistically significant at $p< .01$. A 5-point Likert scale measured the variables, which were recoded into three categories ranging from "high" through "medium" to "low". Spearman's Rho measured the bivariate correlations between the variables because of their ordinal level of measurement.

4. ANALYSIS AND FINDINGS

The first layer of analysis examined the variations in the student experiences of being victimized, their attempts at victimizing someone else, and comparing these aspects according to different categories of sex, class ranks, and student status. The data indicates that a good number of college students are targeted for electrnic harassment and defamation on the social networks: 15.7% of them regularly receive intimidating e-mails during a normal week; 14% experienced intimidating phone calls from those whom they know in their social networks; and 15.3% have been frequently harassed on Facebook or other social networks during a normal week. According to the data in Table 1 (Appendix A), the experiences of being cyberbullied are statistically correlated with Sex and student Status (Rho= .11, p=.01; Rho=.10, p=.04, respectively). Further analysis indicates no significant difference between the sexes or among the class ranks: the χ^2 tests of the difference were significant at p>.05). Also, nontraditional students expressed higher incidents of being victimized in terms of receiving threatening e-mails (χ^2=8.131, p=.02) and phone calls (χ^2=8.677, p=.03) in various social networks. Non-traditional students are often intimidated by the frequency of the media usage by the younger generation—particularly, when school requirements are communicated via texts, Instagram, or Facebook instead of the university provided means.).

Regarding *Attempts to Victimize,* an overwhelming majority of the participants (80.2%) expressed that they are concerned about the effects that their online posts will have on others. As a result, they are very careful about what they post lest they are misinterpreted. Yet, during the month prior to the survey, 14.2% of the respondents reported that they had occasionally or frequently posted harmful/hurtful information concerning others; 23.6% sent e-mails with harmful/hurtful information concerning others; only a smaller number (6.0%) e-mailed another individual or posted messages with intent to physically harm him/her. These are textbook examples of assault—i.e., act in a threatening manner that puts another person in fear of immediate harm (FindLaw, n.d.). A common denominator that qualifies these acts as criminal behavior is the intention to harm. Thus, by definition, the criminal intent to harm someone is present in the behavior of a sizable portion of college students.

Furthermore, the data shows a statistically significant difference between the sexes in regard to the concern about the negative effects that one's posting may have on others ((χ^2=6.939, p=.03). More female respondents than the males expressed concerns about the effects that their postings may have on others. No sex differences were observed in regard to posting harmful/hurtful information online ((χ^2=3.075, p=.21), or sending harmful/hurtful e-mails to someone ((χ^2=0.746, p=.68). Although female participants seemed to be concerned about the contents of what they post, they seemed more inclined toward sending harmful or hurtful texts (χ^2=8.056, p=.01), and posting threats of physical harms (χ^2=5.907, p=.05). This contradiction is peculiar and needs further study on the reasons for this paradox. Also, the behavior difference between the males and the females in terms of texting versus e-mail is unclear. However, both the males (61%) and the females (67.5%) seemed equally inclined toward confronting the bully. Overall, the findings in this study correspond with the findings in the literature: more physically reactivity by the males, and verbal reactivity by the females (Hoff & Mitchell, 2008).

The data further suggests no statistically significant difference between traditional and nontraditional students in terms of the concerns about the negative effects that one's postings may have on others (χ^2=5.525, p=.06), the frequency of posting something harmful or hurtful information about someone else (χ^2=4.446, p=.10), the frequency of sending harmful/hurtful texts (χ^2=1.959, p=.37), the frequency of sending harmful/hurtful e-mails (χ^2=1.062, p=.44), and the frequency of posting threats of physical harm (χ^2=1.284, p=.52). A similar patterns was also observed on the relationship between a student's academic rank and the variables of *Attempts to Cyberbully* (i.e., no statistically significant behavioral differences among Freshmen, Sophomores, Juniors, and Seniors), except for the frequency of sending harmful/hurtful texts (χ^2=15.079, p=.05).

Close to 95% of the respondents actively participate in blogs, chat-rooms, Interne and social network groups. The data in Table 1 (Appendix A) points to a positive and statistically significant (although weak) correlation between vulnerability to being cyberbullied and the number of social network groups to which one belongs (*Rho*=.12, p=.008). Despite the weak correlation between the two variables, increased engagement with different social network groups is a good predictor of increased vulnerability to the risks of being victimized: there is a greater chance of being cyberbullied when the increased engagement in social network groups. Thus, the empirical data supports Hypothesis 2.

One of the biggest issues in cyberbullying is anonymity and questionable identity of the perpetrators. Although 74% to 79% of the respondents expressed trusting the identity of others in their social network groups, a great many (64.3%) frequently question the authenticity of the identity of those with whom they communicate on the Internet. Whereas only 33% of the participants who know the identity of their group members reported being cyberbullied, 46.6 of those who question the identity of their group members experienced being cyberbullied. Statistics in Table 1 (Appendix A) support the hypothesis that communicating with those with questionable identity in online social networks increases vulnerability to being cyberbullied. Although the correlation between awareness of questionable identity of online social group members and experiencing cyberbullying is weak (Rho=.12), this correlation is statistically significant at p=.008 (Table 1, Appendix A). Thus, knowledge of the identity of the members of the social network groups can help us understand vulnerability to cyberbullying. These findings support Hypothesis 3.

Lastly, further tests indicate that victims of cyberbullying are more likely to become cyber-perpetrators. According to the data in Table 1 (Appendix A), the is a fairly strong and statistically significant correlation between being victimized and attempts to victimize someone else (Rho=.24, p<.001). Although the frequency by which one is bullied or bullies someone else varied from case to case, close to one half of those who were cyberbullied (46.3%) attempted to electronically bully someone else either by posting harmful information on the social media, or by sending intimidating or threatening messages via e-mails or texts. Conversely, 77.1% of the respondents who have never been cyberbullied did not attempt to bully some else. The above data supports Hypothesis 4, and corresponds with the findings in the literature.

Although the above bivariate tests delineated the effects of the correlates of cyberbullying, this study employed multiple regression as the second layer of analysis to test the hypotheses (Table 2, Appendix A). Prior to this, tests of multicollinearity ensured >.98 tolerance level for all correlates of cyberbullying, except for the number of membership in social network groups

where the identity of the members is questionable (.85). Accordingly, the variables are independent of each other. Also, the overall model examined in this study is significant (F (6, 438)=4.978, p=.000). Therefore, the model significantly predicts the linear relationship between the constructs and cyberbullying.

The data further suggests that only 7% of the variations in the experiences of being electronically bullied are due to the constructs examined here. The data confirms the inconsequential effects that sex, class rank, or student status differences may have on experiencing cyberbullying. However, the model predicts that one's *Membership in Social Network Groups* (β=.19, p=.000) and one's *Perceptions* of the legitimacy of their members' identity to be good predictors of vulnerability to cyberbullying (β=.19, p=.000; β=.10, p=.03, respectively). The t scores for these constructs (t =3.70 and t =2.092, respectively) are greater than 1.96 (i.e., the confidence interval is greater than 95%). Perhaps, further studies may shed more light on the unexplained portion of the variance in vulnerability to cyberbullying. Nonetheless, the data in Table 2 (Appendix A) is compatible with the findings of the bivariate tests of the hypotheses.

5. DISCUSSION AND CONCLUSIONS

We have noticed in the above literature review that there is no nation-wide, official study of cyberbullying among college-aged students. Although Zacchilli and Velerio (2011) reported a lesser (minimal) number of the instances of cyberbullying experienced by college students as compared with adolescents, the discrepancy is mainly due to conceptualization and approaches to this issue. In general, the findings in the literature point to certain commonalities of constructs and structural variables that measure and predict patterned environments for cyberbullying—for example, although victims are not physically present in the cyberspace, they are within reach via blogs, texts, e-mails, etc. Once verified in this manner, then we can see that characteristics of adolescent cyberbullying can also be found among adult college students.

Moreover, research findings also verify the growth in cyberbullying incidents because of the increasing availability of the media for social networking. We can only speculate the frequency by which cyberbullying or cyber-stalking occurs in any given time. On the other hand, we also noticed that standards that are applicable in a situation of face-to-face bullying may not be applicable to cyberbullying. The problem with cyberbullying is that often such exchanges may not be interpreted as bullying; or, the victim may not know how to react.

We have noticed that cyberbullying does not occur randomly; stopping cyberbullying effectively cannot be accomplished by haphazard intervention or based on case-by-case. An issue that arises at the collegiate level, as the literature suggests, is the ambivalence about the relevance of empirically verifiable variables such as age, gender, race/ethnicity, social class, and a host of other factors to cyberbullying. Another issue in curbing cyberbullying on college campuses could be due to the possibility that campus officials may not be aware of the extent of the problem, or view the small percent of occurrences on their campuses as trivial, which adds to the complexities of the issue, which in turns makes establishing preventive measures even more difficult. Moreover, it seems common practice that colleges and universities, in general, do not provide any education on risks associated with cyberbullying; neither do they provide any guidelines on how to circumvent it.

Although an increasing number of university officials are becoming aware of the issue on their campuses, there are a few loopholes: higher education is immune to liability unless the institution is accused of negligence (Mitrano, 2011); private colleges can exercise discretionary practices (Hinduja, 2009); and, the extent or domain of enforcing the state law in higher education remains unclear, and its effectiveness in preventing cyber-harassment is speculative. For the most part, policies may be ineffective under the protective force of the first amendment, unless the act is perceived as a "meaningful threat" to another person. Perhaps, the reason for the existence of cyberbullying on college campuses is the absence of appropriate control mechanisms in terms of technology usage policies that specifically address cyberbullying and cyber-harassment. Hence, the first step for preventing cyberbullying is the recognition of this problem on campuses. Universities should create a special task force for researching this issue and verifying the extent to which their students and faculty are experiencing cyberbullying, and formulate preemptive measures to prevent the problem. These measures should be based on well-grounded empirical research findings, and must be used as tools for cyber training of the end-users.

Morrison (2002) suggested that cyberbullying must be dealt with at many levels, not the individuals themselves. This can be interpreted as using the expertise of partners (e.g., educators, family members, the community), and involving any other concerned constituents as key actors in conjunction with the university when confronting cyberbullying; or, emulating the industries that have developed policies in place. Sates must enact anti-cyberbullying statues that encompass colleges (Barr & Lugus, 2011); universities must develop mandatory policies that address cyberbullying or cyber-stalking; instructors must familiarize themselves with the effects of technology on the wellbeing of their students, and build in their courses (at least indicate in their syllabi) policies that address cyberbullying; and the social media can approach the issue more responsibly and be employed as grass-root, educational tools for raising awareness.

Although concerns for cyberbullying are ubiquitous, no universal policy is best practiced; they may just offer guidelines to help higher education. However, it is hoped that such collectivity would allow the campus community to exercise appropriate online behavior in accordance with the codes delineated by the collective social order that defines the expectations about the student conduct and academic integrity. Cyberbullying may be exercised either individually or in groups, but it needs to be confronted from the opposing group perspectives—it is a community effort.

6. REFERENCES

Aricak, O. (2009). Psychiatric Symptomatology as a Predictor of Cyberbullying among University Students. *Eurasian Journal of Educational Research*. 34, 167-184.

Baldasare, A., Bauman, S., Goldman, L., & Robie, A. (2012). Cyberbullying? Voices of College Students. *Cutting-edge Technologies in Higher Education. 5*, 127-155.

Barr, J., & Lugus, E. (2011). Digital Threats on Campus: Examining the Duty of Colleges to Protect Their Social Networking Students. *Western New England Law Review*. 33(3), 757-788.

Brown, E. (n.d.) *Cyberbullying on the Rise on Campus*, Bostonia Web Exclusive. Retrieved March 2014 from http://www.bu.edu/bostonia/web/cyberbullying.

Center for Disease Control and Prevention. (2011). Youth Risk Behavior Surveillance. Retrieved March 2014 from http://www.cdc.gov/HealthyYouth/yrbs/index.htm.

Chapell, M., Hasselman, S., Kitchin, T., Lomon, S., MacIver, K., & Sarullo, P. (2006) Bullying in elementary school, high school, and university. *Adolescence,* 41 (164), 633-648.

Davies, M, & Lee, B. (2008). The Legal Implications of Student Use of Social Networking Sites in the UK and US: Current Concerns and Lessons for the Future. *Education & the Law.* 20(3), 259-288.

Deil-Amen, R. (2011). The "Traditional" College Student: A Smaller and Smaller Minority and Its Implications for Diversity and Access Institutions University of Arizona, Center for the Study of Higher Education. Paper prepared for the Mapping Broad Access Higher Education Conference, Stanford University.

Donegan, R. (2012). Bullying and Cyberbullying: History, Statistics, Law, Prevention and Analysis. The Elon Journal of Undergraduate Research in Communications. 3(1), 33-42.

Dryden, J. (n.d.). Cyber Bullying: Legal Guidelines for Policy Construction. Retrieved March 2014 from http://www.*nau.edu/.../COE/.../Cyber%20Bullying.pdf.*

Eslea, M. and Mukhtar, K. (2000) 'Bullying and Racism Among Asian Schoolchildren in Britain', *Educational Research* 42(2): 207–17.

Englander, E. (2008). Cyberbullying and Information Exposure: User Generated Content in Post-Secondary Education. In *MARC (Massachusetts Aggression Reduction Center) Publications)*. Paper 11. Retrieved May 2014 from http://vc.bridgew.edu/marc_sub/11.

FindLaw. (n.d.). Assault and Battery Overview. Retrieved June 2014 from http://criminal.findlaw.com/criminal-charges/assault-and-battery-overview.html.

Finn, J. (2004). A Survey of Online Harassment at a University Campus. *Journal of Interpersonal Violence*. 19, 468–483.

Fukuchi, A. (2011). A Balance of Convenience: The Use of Burden-Shifting Devices in Criminal Cyberharassment Law. *Boston College Law Review*. 52(1), 289-331.

Gilroy, M. (2013). Guns, Hazing, and Cyberbullying Among Top Legal Issues on Campuses. *The education Digest*. 78(8), 45-50.

Hawkins, D., Pepler, D., & Craig, W. (2001). Naturalistic Observations of Peer Interventions. In *Social Development.* Retrieved February 2014 from http://www3.interscience.wiley.com/journal.

Hinduja, S. (2009). The Response of Private and Public Schools to Cyberbullying. *Cyberbullying Research Center*. Retrieved March 2014 from http://cyberbullying.us/?s=college+cyberbullying.

Hindjua, S. & Patchin, J. (2014). State Cyberbullying Laws: A Brief Review of State Cyberbullying Laws and Policies. Cyberbullying Research Center. Retrieved March 2014 from c*yberbullying.us/Bullying_and_Cyberbullying_Laws.pdf.*

Hinduja, S., & Patchin, J. W. (2007). Offline Consequences of Online Victimization: School Violence and Delinquency. *Journal of School Violence. 6*(3), 89-112.

Hoff, D., Mitchell, S. (2008). Cyberbullying: Causes, Effects, and Remedies. *Journal of Educational Administration*. 47(5), 652-665.

Hoover, J. and Olsen, G. (2001) *Teasing and Harassment: The Frames and Scripts Approach for Teachers and Parents.* Bloomington, IN: National Educational Service.

Jäger, T., Amado, J., Matos, A., & Pessoa, T. (2010). Analysis of Experts' and Trainers' Views on Cyberbullying. *Australian Journal of Guidance & Counseling,*20(2), 169–181.

Kowalski, R., & Limber, S. (2013). Psychological, Physical, and Academic Correlates of Cyberbullying and Traditional Bullying. *Journal of Adolescent Health.* 53, 13-20.

Li, Q. (2006). Cyberbullying in Schools: A Research of Gender Differences, *School Psychology International*. 27(2), 157-170.

MacDonald, C., & Roberts-Pittman, B. (2010). Cyberbullying Among College Students: Prevalence and Demographic Differences. *Procedia-Social and Behavioral Sciences. 9*, 2003-2009.

Menesini, E., & Nocentini, A. (2009). Cyberbullying Definition and Measurement: Some Critical Considerations. *Journal of Psychology*, 217(4), 230–232.

Mitrano, T. (2011). Law, Policy, and IT. *Inside Higher education*. Retrieved March 2014 from http://www.insidehighered.com/blogs/law_policy_and_it/national_association_of_college_and_university_attorneys_cyberbullying#ixzz2wXoWNjyJ.

Molluzzo, J., & Lawler, J. (2013). A Comparison of Faculty and Students Perception of Cyberbullying. *Proceedings of Information System Educators Conference*. 30(2533), ISSN: 2167-1435.

Molluzzo, J. C., & Lawler, J. (2012). A Study of the Perceptions of College Students on Cyberbullying. *Information Systems Education Journal. 10*(4), 84-109.

Monette, D., Sullivan, T., & DeJong, C. (2010). Applied Social Research: Tools for the Human Services. 9th edition. New York, NY: Thompson.

Morrison, B. (2002). Restorative Justice for Bullies and Victims in Schools: A Program That Fosters Responsible Citizenship', in *Australian Institute of Criminology's Trends and Issues Series*: Canberra: Australian Institute of Criminology.

Neuman, L. (2011). *Social research Methods: Qualitative and Quantitative Approaches* (7thedition). New York, NY: Pearson Publishers.

Neves, J., & de Oliveira, P. (2010). Cyberbullying: A Sociological Perspective. *International Journal of Technoethics.* 1(3), 24-34.

Olweus, D. (1993). *Bullying at School: What We Know and What we Can Do*. Malden, MA: Cambridge.

Pew Internet & American Life Project (2007). Cyberbullying and Online Teens. Retrieved February 2014 from, http://www.pewinternet.org/PPF/r/216/report_display.asp.

Pieschl, S., Porsch, T., Kahl, T., & Klockenbusch, R. (2013). Relevant Dimensions of Cyberbullying — Results From Two Experimental Studies. *Journal of Applied Developmental Psychology*, 34 (2013), 241–252.

Piotrowski, C., &Lathrop, P. (2012). Cyberstalking and College-Age Students: A Bibliometric Analysis across Scholarly Databases. *College Student Journal.* 46(3), 533-536.

Pratto, F., Sidanius, J., & Levin, S. (2006), Social Dominance Theory and the Dynamics of Intergroup Relations: Taking Stock. *European Review of Social Psychology.* 17, 271-320.

Purusothaman, D., & Rani, U. (2014). Cyberbullying: A Study. *International Journal of Logistics & Supply Chain Management Perspectives*, *2*(4), 483-486.

Reyns, B*.,* Henson, B., & Fisher, B. (2012). Stalking in the Twilight Zone: Extent of Cyberstalking Victimization and Offending Among College Student. Deviant Behavior. 33(1), 1-25.

Shariff, S. (2006), "Cyber-hierarchies: A New Arsenal of Weapons for Gendered Violence in Schools", in Mitchell, C. and Leech, F. (Eds), *Combating Gender Violence In and Around Schools*, Trentham Books, London.

Smith, J., & Yoon, J. (2013). Cyberbullying Presence, Extent, &Forms in a Midwestern Secondary Education. *Information System Education Journal*. 11(3), 52-78.

Smith, P., Mahdavi, J., Carvalho, C., & Tippett, N. (2006). An investigation into cyberbullying,its forms, awareness and impact, and the relationship between age and gender in cyberbullying. A Report to the Anti-Bullying Alliance. Retrieved May 2014 from Http://www.education.gov.uk/research/data/uploadfiles/RBX03-06.pdf.

Spitzberg, B. and Hoobler, G. (2002). Cyberstalking and The Technologies of Interpersonal Terrorism, *New Media and Society* 4: 71–92.

U.S. Department of Education. (2011). Student Reports of Bullying and Cyber-Bullying: Results From the 2009 School Crime Supplement to the National Crime Victimization Survey. National Center for Education Statistics: Institute of Education Sciences. Retrieved March 2014 from http://nces.ed.gov/pubs2011/2011336.pdf.

Walker, C., Sockman, B., & Koehn, S. (2011). An Exploratory Study of Cyberbullying with Undergraduate University Students. *TechTrend.* 55(2), 31-38.

Willard, N. (2004) *An Educator's Guide to Cyberbullying and Cyberthreats*. Retrieved March 2014 from http://cyberbully.org/docs/cbcteducator.pdf.

Zacchilli, T., & Velario, C. (2011). The Knowledge and Prevalence of Cyberbullying in a College Sample. *Journal of Scientific Psychology. (*March), 11-23. Retrieved June 19, 2014, from Retrieved from http://www.psyencelab.com/images/the_knowledge-and_prevalence_in_a college_sample.pdf.

APPENDIX A

Table 1. Bivariate Correlation Coefficient Values

Variables	1	2	3	4	5	6	7
1. **Sex**	__	-.13**	-.07	.08	.01	-.07	.11*
2. **Class Rank**		__	.14**	-.10*	-.05	-.03	.02
3. **Student Status**			__	-.13**	-.06	.09*	.10*
4. **Membership in Internet Groups**				__	.27**	.11*	.12**
5. **Membership in Questionable Internet Groups**					__	.24**	.07
6. **Perceptions About Social Network Groups**						__	.12**
7. **Experience of Being Cyberbullied**							__

* Significance level ≤ .05
** Significance level ≤ .01

Table 2. Regression Coefficients of Constructs as Predictors of Cyberbullying [a]

Constructs	B	SE	β	t	Sig.
(Constant)	4.614	.47		9.890	.000
Sex	.27	.15	.09	1.836	.06
Class Rank	.02	.06	.02	.316	.75
Student Status	.28	.18	.08	1.606	.10
Membership in Social Network Groups	.37	.10	.19	3.700	.000
Membership in Questionable Social Network Groups	.06	.13	.02	.399	.69
Perceptions about Social Network Groups	.30	.14	.10	2.092	.03

$R = .25$ $R^2 = .07$ Adjusted $R^2 = .05$ $F = 4.978$ $df = (6, 438)$ Sig. = .000

a. Dependent Variable = cyberbullied (victimized).

A Match in the Making: How Emergent Changes in the Marketing Discipline Present Opportunities for Information Systems Programs

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Abstract

The digital revolution is upon us, bringing with it disruptive forces in every aspect of business and personal interactions. The business marketing function has become so technologically driven it is sometimes hard to tell where the boundaries between the Marketing and Information Systems disciplines lie. The new world of digital marketing has changed how both marketing and technology professionals approach their jobs. Digital has created new roles, and much of what we knew and taught in higher education is no longer viable. New hybrid education programs are required to equip the new generation of workers with the skills they need to be successful. While marketing and information systems and technology education programs will undoubtedly continue to exist as separate entities, there are opportunities for cross pollination between the two disciplines. Just as corporate enterprises will need to embrace this new way of doing business if they are to be successful, so too will academic enterprises need to incorporate new methods and new ideas into their offerings if they are to remain competitive with their peer institutions. This paper explores the concept of how this new digital world has transformed the marketing function, the impact it has on the consumerization of information technology, and how higher education will have to respond. Digital has arrived, and it is here to stay.

Keywords: Digital Marketing, Social Media, Mobile, CIO-CMO Relationship, Age of the Customer, System of Engagement, CRM

1. INTRODUCTION

Marketing, as defined by the American Marketing Association, is "the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large" (American Marketing Association).

Information systems (IS) has been characterized as "the study of complementary networks of hardware and software that people and organizations use to collect, filter, process, create, and distribute data" (Jessup, 2008).

Much attention has been paid to the intersection of these two disciplines, and what it means for the respective function leaders (i.e. Chief Marketing Officer [CMO] and Chief Information Officer [CIO]). Within just the last ten years,

marketing has gone from being one of the least technology dependent business functions to being one of the most. Marketing now relies more heavily on technology to accomplish its mission than any other industry "in the history of computing" (Brinker, 2014), and is in fact increasingly being viewed as a technology-powered discipline (Brinker & McLellan, 2014). This change requires a paradigm shift in how both Marketing and Information Technology (IT) professionals approach their work (Brinker, 2014).

We use the term paradigm shift, particularly with respect to technology, to mean a change from one way of thinking to another. It is encompassing in the manner of revolutions, transformations, and metamorphoses (Tapscott & Caston, 1993). It is common that agents of change drive paradigm shifts (Perez, 2004).

The agents of change responsible for the metamorphosis of marketing into a technology driven discipline are advances in technology itself. According to Scott (2007) "technology is doing to marketing what it did to financial markets: driving it toward automation and real-time analysis." In many ways, 20 years of the disruptive technology that is the World Wide Web has completed its cycle of massive disruption in the discipline of marketing (Brinker, 2014; Christensen, 2013).

In order to understand what Information Systems may contribute to this paradigm shift in marketing, it is important to understand why marketing has become so technologically dependent. One obvious answer is that the world in general, and business in particular, has become much more technology dependent. Technology connects us to data and people in a way that is both pervasive and ubiquitous; we are in a digital "hyper-connected" set of inter-connected cultures, societies, nations, and people (Saha & Mukherjee, 2003). Digital has fundamentally and forever changed the world (Brinker, 2014). Specific to marketing, consumers are now demanding goods faster, better, cheaper, and with a higher degree of service; technology makes it possible for them to have it (Cooperstein et al., 2013). There is no question that a technology-fueled customer-led disruption is underway (Cooperstein et al., 2013). Moreover, the new paradigm will continue to evolve as technology and society evolve.

This paper reviews the technology-driven paradigm shift in the marketing discipline to better understand the implications for the information systems discipline and curriculum such that the emerging partnership between these disciplines may become more formalized. As both disciplines tend to exist in colleges of business, it would seem natural for new hybrid curricula to emerge that is symbiotic and co-creative. We do not foresee either discipline losing its core identity, but rather see complementary competencies that are ripe for collaboration.

This paper goes on to discuss the marketing discipline, the advent of technology and how it has impacted marketing, how digital has changed the roles and relationship of the CIO and CMO, and the implications of this shift to education.

2. CLASS NOTIONS OF THE MARKETING DISCIPLINE AND THE ADVENT OF TECHNOLOGY

Marketing has grounded its discipline on the four P's for more than half a century: Product, Place, Price, and Promotion (Ettenson et al., 2013). The formula was simple: put the right product in the right place and time at the right price with the proper promotion mix (*MindTools*). Prior to the digitization of almost everything, that formula worked. Marketers were in charge of the information – and the information flow (Fetherstonhaugh, 2009). Customers had few options for discovering brands, and had to wait to be made aware of a product's value (Burris, 2013). Promotion consisted of static messages delivered via large-scale mainstream media, which could be used to efficiently communicate with large segments of the population (Fetherstonhaugh, 2009), and customers were led down a logical path from prospect to loyal customer (Burris, 2013).

Now, however, that traditional buyer – seller dynamic has changed dramatically (Aberdeen Group, 2013). Technological advances have shifted the power between vendors and consumers in favor of the consumer (Bieler et al., 2014). While the customer was always at the center of the marketing mix, now the customer is in control (Fetherstonhaugh, 2009).

Forrester Research defines this new world as the "Age of the Customer": "A 20-year business cycle in which the most successful enterprises will reinvent themselves to systematically understand and serve increasingly powerful customers" (Cooperstein et al., 2013).

Brinker (2014) posits that there are three disruptive forces primarily responsible for this phenomenon: open information, open communications, and customer experience. We will explore each of these in the following sections.

Open Information

1990 to 2010 was the age of information (Cooperstein et al., 2013). With the dawn of the World Wide Web in 1990, and the original search engine in 1994 (IEEE Computer Society History Committee, 2012), came the dawn of open information.

As search engines have become more advanced and "intelligent", information has become easier to find. Information gathering and sharing, that used to be done manually – and take days, weeks, or months – is now accomplished in seconds. Open information has given buyers more power than ever. 2010 and beyond will be the age of the customer (Cooperstein et al., 2013).

Today's consumers are active in their search to acquire sources of value to satisfy their needs. They use many channels to proactively seek information everywhere, instantly (Burris, 2013). Something as simple as a multitab browser allows prospective buyers to compare product pricing and features with ease (Cooperstein et al., 2013). Ready access to this kind of information means that marketing has become much more inbound, as opposed to outbound – where passive customers waited to be found and informed of your value proposition. Marketers must now earn their customer's attention, as opposed to buying it (Drell, 2011).

Open Communication

Keeping customers' attention is proving to be yet another challenge. Gone are the days when televisions were used for entertainment, computers for productivity, and telephones for communication. Now they're all screens (Laskowski, 2014), and all being used simultaneously. Entertainment is being streamed; consumers are "DVR'ing" through advertisements; and if watching something live, using ad time to check emails or social media (Reyes, 2015a). Audiences are splintered in fragments and slices (Fetherstonhaugh, 2009). In the age of the customer, marketers must deliver their content to consumers when and where they are, not where they want them to be (Reyes, 2015a). Instead of a static message delivered via large-scale media, today's marketing communication is comprised of a dizzying assortment of digital touch points across various websites, social networks, broadband and mobile devices (Brinker, 2014). Marketers can – and must - use blogs, podcasts and white papers to create engaging content that is interesting, informative, adds value (Drell, 2011), and cuts through the noise of so many distractions (Reyes, 2015b).

Information flows are multidirectional but especially strong among customers themselves. (Burris, 2013). Consumers use on-line ratings and reviews to guide their purchase behavior (Topinka, 2014), many of which are shared experiences by other consumers. This escalation in communication does not just benefit the consumer, either. Businesses gain valuable information by tracking customers' online shopping and buying behavior (Florentine, 2013). Email marketing automation lets organizations track open rates, know who clicks which links, and what prospects do when they visit a website. Some also provide email forward rates (Vance, 2012). The new marketing communication environment is so many unstructured one-to-one and peer-to-peer conversations (Fetherstonhaugh, 2009).

Social Media

Social media is one of the most compelling examples of how technology and the new communication environment impacts marketing practices (*Gartner*, 2012). Social media is not entirely a new phenomenon. Consumers have long been influenced by their peers when considering purchase decisions. Few have been reluctant to share their displeasure when a product or organization disappointed them. What is new, however, is that word-of-mouth now happens instantly and has far greater reach (Vance, 2012). Social media outlets – such as Twitter, Pinterest, Facebook -,allow customers to share their experiences not only with their peers, but globally (Florentine, 2013). Social media is a platform where "audiences have audiences" (Laskowski, 2014). The back-end of one buyer's experience, when shared, may serve as the foundation of the research cycle for another customer (Vance, 2012). CMOs are just beginning to understand the complexity of interactive social media (Nash, 2012a) and the influence personal activities of sharing comments, links and recommendations has on what individuals buy (*Gartner*, 2012).

Understanding the marketing nature of social media presents somewhat of a challenge for the CIO. IT must develop, understand, manage, secure, and support the applications that allow

for collecting, maintaining and sharing disparate bits of knowledge gleaned by listening to these conversations. Without the analytical tools and metrics provided through technology, social media would just be "shouting in the dark" (Nash, 2012b). This new responsibility is immensely different from anything the IT department has previously done. "Social networks are as different from computer networks as playing a piano is from building a piano." (Nash, 2012a)

Mobile

Advances in mobile technology have contributed greatly to the explosion of open information and open communication. Connections to people and information through mobile devices have become ubiquitous (Cooperstein et al., 2013). Consumers use smartphones to research and buy products from anyone at any time anywhere (Topinka, 2014). The shift to mobile does not refer simply to devices. It has evolved into an entirely new process used for making purchasing decisions. Referred to as the "mobile mind shift", customers expect that "any desired information, service, or product is available on any appropriate device, in context, at their moment of need" (Colony et al., 2013).

For IT as well, mobile is more than just another device to support, a shrunken website, or a screen-scraped application. Rather, "mobile is the visible manifestation of a much broader shift to systems of engagement that marry physical context and digital intelligence to deliver service directly into a person's hands" (Burris, 2013).

Big Data

Information is the lifeblood of today's organizations (Feldman et al, 2012). Marketers are capturing data about customers at every touchpoint; but using disparate tools to track online, offline, web, social, mobile, and advertising data does not provide a comprehensive view of the customer (Platfora). How can CMOs manage all these channels, and connect these billions of unconnected, unstructured data points back to specific individuals, to generate insights that are predictive, not just historical — all on a massive scale (Baird & Ban, 2013)? The only answer is technology. To connect with individual customers at every touchpoint effectively, marketers need a cohesive resource capable of reaching down to the customer level – revealing each customer's individual value and inclination to respond to different stimuli to predict next-likely-action functionality (Yamnitsky, 2014).

While Marketing has always been responsible for knowing the customer, now marketers must be obsessed with understanding and responding to customers as individuals (Baird & Ban, 2013). In the age of the customer, the only sustainable competitive advantage is a thorough knowledge of and engagement with customers at every level (Cooperstein et al., 2013). Only customer-obsessed enterprises will prosper, and be able to increase market share, revenue, and profit in the age of the customer (Colony et al., 2013).

Marketers' knowledge and use of distinctive elements of consumers' behavioral data such as clickstreams and site search records can help them understand consumers' interests, impulses and motivations; thus tailor offerings that are closely aligned with their preferences (White et al, 2007). It also requires them to collect enormous amount of data (Henschen, 2013).

Every hour, terabytes of video are uploaded, gigabytes of location data are streamed, billions of emails are sent, and there are tens of millions of Facebook posts and tweets (Colony et al., 2013). The unstructured, or human friendly, data contained in these documents, email messages, contact center recordings and comments on social forums, tweets, blog posts, online product reviews and verbatim answers to open-ended survey questions is where the valuable nuggets of untapped customer knowledge exist (Feldman et al., 2012). Using context to derive the conceptual meaning of these interactions allows the human functions to be automated (*Hewlett-Packard, 2013*).

Structured, historical data is also valuable, but due to the inherent constraints imposed by an inability to anticipate every actual opinion in closed ended response options, it does not provide for a multidimensional view of the customer. Technology-enabled understanding of both the structured and unstructured data, combined, is exponentially more valuable than the structured data by itself (*Hewlett-Packard*).

Somewhere in that big data is the right data (Sitecore, 2014). If marketers want to provide their customers with excellent experiences, they will have to find the gems in this data and translate them into better business offerings (Colony et al., 2013). The most successful IT leaders of the next generation will be able to spot the data elements that create critical customer insights, and weave them together into a dynamic system that will deliver strategic and competitive advantages to the enterprise (Araujo, 2013). Moving beyond discrete,

unrelated bits of customer interaction data is the first step in understanding voice of the customer data and being able to respond to the new insights (*Hewlett-Packard*).

With the right data, and tools to extract and manipulate it, marketers can create experiences that go beyond just personal ("Welcome back Sam") to contextual ("Glad to see you back in Dallas on your mobile, Sam"). Tying the customer's complete profile, past engagement history, and current situation into contextually personalized customer experiences exude relevance when done well (Cooperstein et al., 2013).

Too much personalization, however, may backfire. It was not long ago that this type of behavioral tracking was considered too intrusive (Vance), and perceived as too personal — going beyond friendly recognition to suggest an inappropriate level of familiarity with an individual's preferences and behaviors (White et al). It is critically important to know how customers respond to various stimuli, and to respond in customer-friendly ways or consumers may feel a sense of being too identifiable by the firm (White et al), leading to a negative experience.

Customer Experience (CX)

More and more, the customer's experience (CX) **is** the firm's brand (Brinker, 2014). It is by far the greatest driver of a company's business value (Sitecore, 2014). Forrester Research data show that a strong correlation exists between the quality of a firm's CX and the likelihood of customers buying from the company again (0.71), or recommending that firm to another (0.64) (Schmidt-Subramanian, 2013). Traditionally, marketing has been the owner of the CX function (Topinka, 2014). This approach no longer makes sense. As each distinct customer interaction is an ingredient in the overall CX, (*Hewlett-Packard*) today's operating model for CX management requires a collaborative approach in order to be effective (Topinka, 2014).

The implications of CX for the CIO are huge. Great customer experiences begin with and rely on great information (Fenwick, 2013). As consumer activity increasingly takes place in the digital realm, nearly every touch point is supported by – and information gathered must be managed by – technology in some way. Improving CX is a top priority for CIOs as CEOs turn to IT leaders to help shape positive CX through digital technologies (Fenwick, 2013). If organizations are judged by CX (Brinker, 2014), and technology influences CX, it follows that market share and customer satisfaction will depend on the quality of the firm's customer technology (Colony et al. 2013).

Journey maps visually illustrate a customer's processes, wants and needs, and experiences over the course of their relationship with an organization. These documents highlight the various things customers do as they seek to satisfy their needs. Empowered customers can no longer routinely be moved down a specific path. They move through markets as fits their needs and schedules. Customers take many paths during their purchase journey, often triggering business capabilities in unpredictable ways (Burris, 2013). Because of this, every moment of engagement, each interaction, is a test of the business. CIOs must be able to translate customer journeys – whether by search, social media, mobile apps, or a growing collection of digitally powered devices – into reliable and predictable systems of engagement that will transform the business. To accomplish this task successfully will require marketing's help (Burris, 2013).

3. THE CIO-CMO RELATIONSHIP

Today, marketing is more of a science than an art (Vance, 2012). CMOs and CIOs alike must acknowledge that technology and marketing are now intimately entwined (Arthur, 2012). In today's uber-connected digital world, everything that a business does – the entire CX that it delivers – is now the purview of marketing. Marketing is taking over the business, and technology, in turn, is taking over marketing (Brinker, 2014).

Forrester Research suggests a totally new perspective, Business Technology (BT), is necessary to bring together these two realities. Forrester defines BT as: "Technology, systems, and processes to win, serve, and retain customers." CIOs and CMOs will have to work together to successfully carry out the BT agenda (Colony et al., 2013).

The notion of BT is more than an IT transformation of better back-office technology, nor does transforming an enterprise from a product focus to a customer focus happen simply by installing technology. BT is the channel whereby front-office experiences are delivered and the customer's voice is heard (Brinker, 2014).; It requires a commitment pervasive throughout the organization that ensures

customer value and relationships are paramount (Peppers & Rogers).

Technology can make a customer transaction painfully slow or incredibly fast (Fenwick, 2013), which will affect CX and loyalty. According to CEB Analytics, 96% of customers are more disloyal after a high-effort experience, as opposed to only 9% who become disloyal after a low-effort interaction (Accelerating Digital Marketing, 2013).

Today, people don't just visit websites to gain information. They go expecting to interact with functional applications (Brinker, 2014). Keeping a modern website running well is demanding, but imperative, for keeping customers satisfied in a hypercompetitive, technology-driven business world (Florentine, 2014). IT professionals must become experts in seeing that CX lives up to the marketing promise (Fenwick, 2013).

Integration challenges

As marketing becomes more dependent on technical solutions for customer engagement, and IT's directive expands to include front office enablement, both functions are busy looking for their own solutions. Despite common goals, their initiatives are often not as integrated as either of them might wish (Baird & Ban, 2013).

A primary reason for lack of Marketing and IT integration is an inherent difference in perspectives. While CX, or Customer Relationship Management (CRM), technology is the fastest-growing software applications market in the US, a majority of CRM implementations have not fulfilled their sponsors' objectives. This may be explained by the view that CRM is not a software package, nor a database, website, or loyalty program. CRM is a complete philosophy (Peppers & Rogers). To be successful, executive-level cooperation alone is not sufficient. If true integration is to be realized, the integration must go deeper and address structural differences at the organization support level, and the disconnect between IT and marketing staff's objectives (Accelerating Digital Marketing, 2013).

Two major drivers of BT are speed and agility, neither of which have traditionally been IT's forte (Pratt, 2014). Forrester analyst Sheryl Pattek says: "Marketing wants the tools delivered yesterday, while IT generally prefers a more deliberative approach." (McLellan, 2014) Marketers need speed and flexibility. They also need consistency and integrated systems that reveal truths in the data – regardless of the source – to enable a seamless CX, and provide for better customer insight and performance measurement (Accelerating Digital Marketing, 2013).

CMOs are charged with maximizing a customer's total lifetime value, which requires all customer interactions to be fully optimized (Pratt, 2014). Siloed marketing, customer service, IT and other functions makes it difficult to achieve alignment around, and target relevant messages to, the appropriate audience. Cross-functional collaboration can solve this problem by providing a shared view of the customer (Arthur, 2012). Customer journeys, systems of engagement, and business capability networks may be familiar concepts in either marketing or IT arenas, but rarely both. The IT and customer-facing groups must exchange knowledge and ideas with these concepts to encourage the collaboration necessary to win, serve, and retain customers through technology (Burris, 2013).

Another key disintegration factor is risk. In this increasingly online world, fraud and identity theft are also increasing (Shillito, 2012). Everything from mundane password policies for social media accounts, to new industry regulations, as well as laws governing consumer privacy and other security concerns must be considered (Arthur, 2012). Marketing tends to view these concerns, and the IT policies that address them, as obstacles (Accelerating Digital Marketing, 2013). However, if personal customer data is not adequately protected, ignoring these policies could lead to serious legal problems, as well as an extremely negative CX (Reubens, 2013). So, CMOs must not discount process discipline, which is essential to the successful deployment and management of technology and CIOs must understand that CX is non-negotiable (Vance, 2012).

How to solve

Spending on technology outside the IT department is growing rapidly, and is now adding an average of 40% to companies' IT budgets (Goodwin, 2014). Laura McLellan, Research VP for Gartner, predicted that CMOs will outspend CIOs on technology within five years (*Gartner*, 2012).

While it is inevitable that marketing will exert considerable influence over technology spending in the future, doing so without a strong cross-functional collaboration with IT makes no sense (Arthur, 2012). Gartner's "Digital Transit Map" (Appendix A) illustrates the bewildering number

of technology platforms available from which to choose, and a marketing organization can easily get caught up with the bells and whistles of one or another platform or application (Pratt, 2014). This maze of digital marketing needs and varied solutions (Appendix B, C) has led to confusion at a time when organizations most need clarity (Sorofman et al., 2007).

CMOs want to experiment with different technologies to find the ones that work, but they don't have the expertise – or desire – to run them at scale (Accelerating Digital Marketing, 2013). IT organizations must take the lead in digital transformation (Topinka, 2014) by utilizing its expertise in vendor selection experience, integration skills, and security awareness to meet the business needs of the CMO (McLellan, 2014).

According to IBM's 2013 Global Survey of Marketers, "managing, collecting and making use of internal and external data" is one of the top five challenges marketing professionals face (Pratt, 2014). CMOs and CIOs can join forces in understanding and unleashing the power of data to make marketing initiatives more impactful (Florentine, 2013).

Regardless of who signs the checks, CIOs will continue to hold significant responsibility for delivering digital experiences. To paraphrase Mark Twain, the reports of the CIOs demise at the hands of the CMO have been greatly exaggerated (Fenwick, 2013).

To help avoid conflict and ensure collaboration, many organizations are moving towards increasingly blurred leadership and titles for the CMO and CIO functions (Pratt, 2014). When asked about steps taken to support digital marketing, 38% of executive respondents replied that they had increased marketing technology expertise in IT, with an equal number saying they had increased technology expertise in marketing (Henschen, 2013).

Science hypothesizes that evolution does not happen slowly and steadily over time. Instead, "new species tend to arise in bursts of evolutionary activity, triggered by major disruptions in the environment" (Brinker). Whatever the title, a new species is emerging at the center of the digital transformation: one that is part strategist, part creative director, part technology leader, and part teacher (Brinker & McLellan, 2014). These hybrids can be marketers who have developed technical skills or technologists who have embraced the marketing concept (Brinker, 2014).

To grasp how far the notion of a combined marketing and technology function has come in a relatively short time span, consider that the role of a chief digital officer or chief marketing technologist was, at best, a niche subject in 2008 (HBR). Yet, by 2015, Gartner predicts that 25% of businesses will have embraced the role (Laskowski, 2014). No matter the name, the role essentially acts as a bridge between marketing and IT, ensuring that technical and marketing requirements are met, and that marketing's systems adhere to IT policies (McLaughlin, 2014).

Summary Thoughts on the Revolution

Disruption is not new. Throughout time innovation has changed the formula for success (Belissent, et al. 2014). Marketing is and always has been about communicating a value proposition, educating people, and explaining the value of what you can do to help them (American Marketing Association, 2013). How this is accomplished now is what is different.

While technology is and always has been a critical business function, successful technology leaders in the future will know more about the customers and, more importantly, have a passion for attracting, retaining, and serving them (Larry Bonfante CIO Bench Coach, author). This is an exciting shift in the technology profession (McLellan, 2014), and may turn out to be the best part of the CIO's job. "Most CIOs and CTOs didn't intend to be the mechanic in overalls who deals with the complex stuff nobody wants to pay attention to," Forbes contributor and CTO for CITO Research Dan Woods reasons. "But too often, for many reasons, that is what happened" (Laskowski, 2014).

The bottom line is that IT can be a true business differentiator when it is focused around the voice of the customer (Mullins, 2014).

4. IMPLICATIONS FOR IS EDUCATION

The issues presented throughout this paper, and the resulting opportunities for IS educators, can be summarized in one overarching question: "What are the implications, for business, of information, interaction, and mass-customization technologies" (Peppers & Rogers)?

Many colleges and universities are developing specialized programs in analytics, data quality and data management (http://data-informed.com/how-to-find-the-right-analytics-education-for-you/). Graduate degree programs focused on technology management have begun to proliferate. These programs incorporate analytics, general management, and soft skills (collaboration, team building, communication, emotional intelligence, and non-linear thinking) in various ways to help close the professional development gap that exists among many technology professionals (Schiller, 2011). Other programs offer students a dual specialty degree in some area (technology, analytics e.g.) along with a MBA so as to provide both depth in a specific area and breadth of general business management. This is a start, but is it enough to produce graduates with the skills in demand by businesses today?

The burgeoning CRM and other technological advancements have given businesses incredible new tools. However, the skills required to leverage them are seriously lacking (Peppers & Rogers).

In academia as in business, both Marketing and IS must collaborate, but also exist separate from one another. They attract and require professionals with different mind sets. Just as businesses should not have their Marketing team making technology decisions (for all the reasons previously noted), colleges and universities should not have their Marketing faculty teaching IS and vice versa. However, both disciplines need to understand and respect the work of the other.

One way to solve for this collaborative dilemma is to create a hybrid track for both Marketing and IS students, co-developed and taught by IS and Marketing faculty that addresses these challenges.

A complete customer technology solution is comprised of many elements. This hybrid track could include coursework in CRM and mass-customization technologies; the Systems Integration curriculum could incorporate mobile and social technologies. To provide a complete customer picture, students would learn how to organize an enterprise's information resources; identifying, linking, and cataloguing customer attributes across databases (Peppers & Rogers).

Poor data quality has stymied business intelligence and analytics projects for decades (Henschen, 2013). New Analytics programs could incorporate financial characteristics (Peppers & Rogers), and use a truly integrated methodology to analyze data gathered from various touch points.

Developing intuitive user interfaces, and integrating relevant data mining algorithms into the actual touch point applications, would be useful. Additionally, to accommodate the new, mass-customized world, supply chain management becomes demand chain management (Peppers & Rogers, 2004).

5. CONCLUSION

Marketing's embrace of technology to the extent that the discipline's core values and assumptions are changing should not be seen as a threat. Rather, the paradigm shift in marketing begs for another discipline, such as IS, as a partner to drive and realize the systems, software, and technologies that have become the lifeblood of marketing.

Dell CIO Andi Karaboutis suggests that in business, the way to succeed is "putting the customer at the center of everything, and gaining insights at the speed of the customer, not the speed of IT" (High, 2014). She further says, "There are technology savvy marketers and Marketing savvy IT people. You bring that together, and you can disrupt and really win in the marketplace. . . It's a culture change and then a drive toward understanding Marketing and technology together and what they can deliver" (High 2014).

These concepts apply equally in academia. Substitute "student" for "customer", identify – or create – tech savvy marketing students and marketing savvy IS students, bring them together and you have a graduate with valuable skills, who will excel in the workplace, and a winning program for a school.

The field is wide-open for professionals – and academic institutions – with initiative who are willing to stretch their boundaries and develop this hybrid skill set (Peppers & Rogers).

6. REFERENCES

American Marketing Association (2013). Definition of Marketing. https://www.ama.org/AboutAMA/Pages/Definition-of-Marketing.aspx

Araujo, C. (2013). The Four Roles of the New IT Leader. CIOINSIGHT. Retrieved from

http://www.cioinsight.com/it-management/expert-voices/the-four-roles-of-the-new-it-leader

Arthur, L. (2012). Five Years From Now, CMOs Will Spend More on IT Than CIOs Do. *Forbes*. Retrieved from http://www.forbes.com/sites/lisaarthur/2012/02/08/five-years-from-now-cmos-will-spend-more-on-it-than-cios-do/

Baird, C. & Ban, L. (2013). CMOs and CIOs, Acquaintances or allies? *IBM*. Retrieved from www-935.ibm.com/services/us/gbs/thoughtleadership/ibv-cmo-cio.html

Belissent, J., Parrish, R., Matzke, P., Gliedman, C. & Iannopollo, E. (2014, June 3). The Age of the Citizen: Smart Governments Embrace and Enable Disruption. *Forrester Research*.

Bieler, D., Ried, S., Matzke, P. & Iannopollo, E. (2014, Feb 4). Connected Business: A New Style Of Doing Business. *Forrester Research*.

Brinker, S. (2014). A New Brand of Marketing: The 7 Meta-Trends of Modern Marketing as a Technology-Powered Discipline. Retrieved from http://chiefmartec.com/2014/03/new-brand-marketing-technology/

Brinker, S. & McLellan, L. (2014). The Rise of the Chief Marketing Technologist. Harvard Business Review. Retrieved from http://hbr.org/2014/07/the-rise-of-the-chief-marketing-technologist/ar/1

Burris, P. (2013). Linking Customer Engagement To Business Capabilities In The Age Of The Customer. Forrester Research.

Christensen, C. (2013). The innovator's dilemma: when new technologies cause great firms to fail. Harvard Business Review Press.

Colony, G., Burris, P., McNabb, K. & Smith, A. (2013). Technology Management in The Age Of The Customer. Forrester Research.

Cooperstein, D.M., Bernoff, J. Hayes, A., and Ryckewaert, E. (2013). Competitive Strategy In The Age Of The Customer. Forrester Research.

Drell, L. (2011). Inbound Marketing vs. Outbound Marketing. Mashable. Retrieved from http://mashable.com/2011/10/30/inbound-outbound-marketing/

Ettenson, R., Conrado, E., & Knowles, J. (2013). Rethinking the 4 P's. Harvard Business Review, 26.

Feldman, S., Reynolds, H., & Schumbmehl, D. (2012). Content Analytics and the High-Performing Enterprise. IDC.

Fenwick, N. (2013). IT's Role in Winning Customer Experience. Forrester Research.

Fetherstonhaugh, B. (2009). The 4Ps Are Out, The 4Es Are In. Ogilvy & Mather. Retrieved from http://www.ogilvy.com/#/News/Articles/December-2012-The-Ogilvy-and-Mather-guide-to-effectiveness.aspx/

Florentine, S. (2013). CMOs Must Expand Their Tech Skills in the Digital Marketing Era. CIO.com. Retrieved from www.cio.com/article/print/742537

Gomez, S. (2014). Building Web Performance through Balance and Efficiency. ITwhitepapers. Retrieved from http://selena-gomez-now.blogspot.com/2014/06/building-web-performance-through_20.html

Goodwin, B. (2014). CIOs should leave innovation to marketing. ComputerWeekly.com. Retrieved from http://www.computerweekly.com/news/2240221928/CIOs-urged-to-manage-infrastructure-and-leave-innovation-to-marketing?asrc=EM_EDA_30031419&utm_medium=EM&utm_source=EDA&utm_campaign=20140605_CIOs%20should%20%27leave%20innovation%20to%20marketing%27_

Henschen, D. (2013). Spend trend. InformationWeek. Feb. 11, 2013 Issue 1,357 p. 17.

High, Peter (2014). Dell CIO Andi Karaboutis Helps Dell Put The Customer First. Forbes.com. Sep. 2, 2014.

IEEE Computer Society History Committee. (2012). Timeline of Computing History. http://www.computer.org/cms/Computer.org/Publications/timeline.pdf retrieved July 15, 2014

Jessup, L. (2008). Information Systems Today: Managing in the Digital World (3rd. edition).

Laskowski, N. (2014). Chief digital officers are a blessing and a curse for CIOs. Retrieved from http://searchcio.techtarget.com/opinion/Chief-digital-officers-are-a-blessing-and-a-curse-for-CIOs.

McLaughlin, E. (2014). Chief marketing technologist emerges to align marketing and IT. TechTarget. Retrieved from http://searchcio.techtarget.com/news/2240223508/Chief-marketing-technologist-emerges-to-align-marketing-and-IT

McLellan, L. (2012). By 2017 the CMO will Spend More on IT Than the CIO. Gartner Webinars.

Mullins, R. (2014). CIOs and CMOs: Power couple or strange bedfellows? Network World. Retrieved from http://www.networkworld.com/news/2014/010614-cio-cmo-277271.html

Nash, J. (2012a). Why the CIO Needs the CMO. CIOINSIGHT. Retrieved from http://www.cioinsight.com/c/a/Careers/Why-the-CIO-Needs-the-CMO-730631/ Posted 03-05-2012.

Nash, J. (2012b). International Speedway: Where the CIO Runs Marketing. CIOINSIGHT. Retrieved from http://www.cioinsight.com/c/a/Careers/International-Speedway-Where-the-CIO-Runs-Marketing-389581/ Posted 03-07-2012.

Peppers, D., & Rogers, M. (2004). Managing Customer Relationships A Strategic Framework. John Wiley & Sons, Inc.

Perez, C. (2004). Technological revolutions, paradigm shifts and socio-institutional change, in Globalization, economic development and inequality: An alternative perspective, 217-242.

Pratt, M. (2014). 7 Things Marketing Wants to Say to IT. Computerworld. Retrieved from http://www.computerworld.com/s/article/9246018/7_things_marketing_wants_to_say_to_IT

Reubens, P. (2013). Are CIOs Destined to Work for the CMO? CIO.com. Retrieved from www.cio.com/article/print/741084.

Reyes, Kyle (2015a). The "It's All About Me" Economy. Retrieved from https://www.linkedin.com/pulse/its-all-me-economy-kyle-reyes.

Reyes, Kyle (2015b). Smiling Seniors and Website Conversions. Retrieved from https://www.linkedin.com/pulse/smiling-seniors-website-conversions-kyle-reyes.

Saha, D., & Mukherjee, A. (2003). Pervasive computing: a paradigm for the 21st century. Computer, 36(3), 25-31.

Schiller, M. (2011). Why IT Gets No Respect. CIO INSIGHT. Retrieved from http://www.cioinsight.com/c/a/Expert-Voices/Why-IT-Gets-No-Respect-158281/.

Schmidt-Subramanian, Maxie (2013). The Business Impact Of Customer Experience. Forrester Research.

Scott, D. M. (2007). The new rules of marketing and PR: how to use news releases, blogs, podcasting, viral marketing and online media to reach buyers directly. John Wiley & Sons.

Shillito, Douglas (2013). It's all about the customer. IBM Corporation.

Sorofman, J., Frank A., Gassman, B., Sarner, A., & McGuire, M. (2013). What's a Digital Marketing Platform? What Isn't? Gartner. G00252512.

Tapscott, D., & Caston, A. (1993). Paradigm Shift: The New Promise of Information Technology. McGraw Hill, Inc., Professional Book Group, 11 West 19th Street, New York, NY 10011.

Topinka, J. (2014). CIO Strategy for the "Age of the Customer," Part One. The Heller Report. Retrieved from http://blog.hellersearch.com/Blog/bid/198565/CIO-Strategy-for-the-Age-of-the-Customer-Part-One?utm_campaign=the-heller-report&utm_source=hs_email&utm_medium=email&utm_content=13426331&_hsenc=p2ANqtz--lJDw2lY1q2nv8Wgj2EHmIVwuj1kSwEZuUT4ZDHzlZSuj5le1djYzHfvHyhKipzodKV8Z6R7LkFiUoXNQ1YvNfygb1Aw&_hsmi=13426331 Posted by Martha Heller on Jun 11, 2014.

Vance, J. (2012). Are CIOs threatened by the rise of the CMO? ComputerworldUK.

Retrieved from http://www.computerworlduk.com/in-depth/careers/3407178/are-cios-threatened-by-the-rise-of-the-cmo/

White, T., Zahay,D., Thorbjørnsen, H. & Shavitt, S. (2007). Getting too personal: Reactance to highly personalized email solicitations. Springer Science + Business Media, LLC.

Yamnitsky, M. (2014). Vendors Scramble To Enable Contextual Mobile Moments. Forrester Research.

Accelerating Digital Marketing (2013). The Corporate Executive Board Company.

Gain A Holistic View of your Customer's Journey with Platfora Big Data Analytics (2014) Platfora, Inc. Retrieved from resources.cio.com/ccd/assets/70227/detail.

Gartner Says Nexus of Forces Social, Mobile Cloud and Information - Is the Basis of the Technology Platform of the Future. Gartner. Retrieved from http://www.gartner.com/newsroom/id/2097215 July 30 2012.

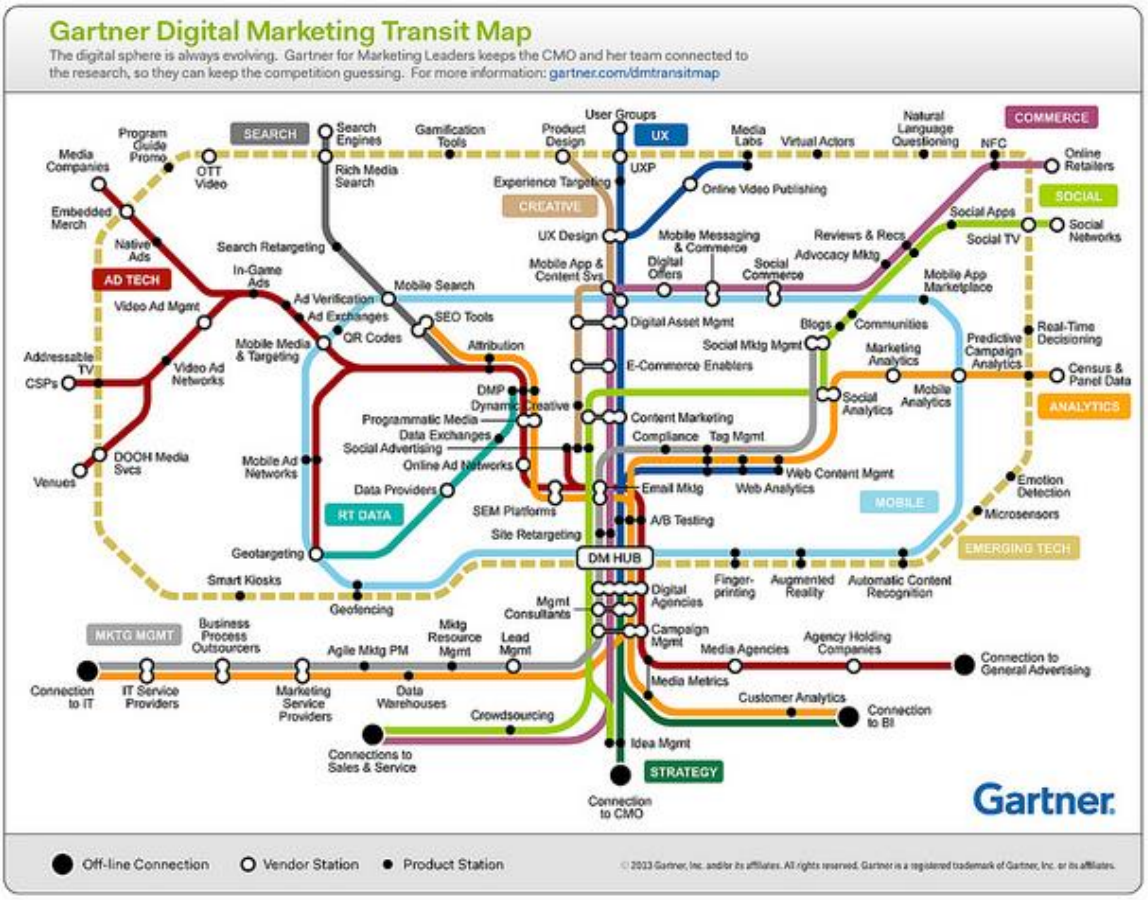
Real-Time Unified Customer Engagement: How to Delight Empowered Customers. Aberdeen Group. June 2013. Retrieved from www.aberdeen.com

Sitecore, (2014). The Data Apocalypse - Is Your IT Organization Ready?. Retrieved from http://www.bitpipe.com/detail/RES/1402337635_489.html

The Marketing Mix and 4 Ps. MindTools. Retrieved from http://www.mindtools.com/pages/article/newSTR_94.htm

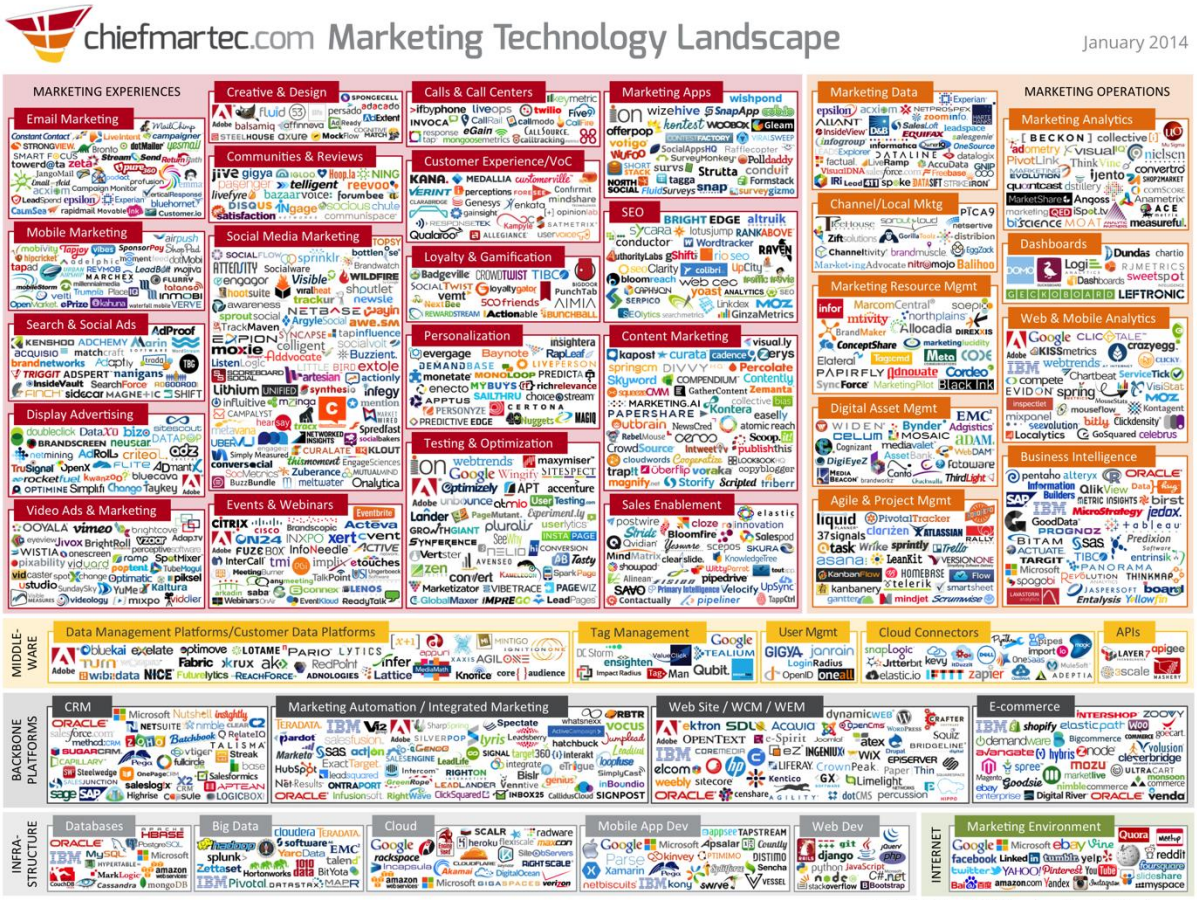
Understanding the Voice of the Customer. (2013) Hewlett-Packard Development Company, L.P.

Appendix A: Digital Transit Map



(Gartner, 2013)

APPENDIX B: Marketing Technology Landscape



(Brinker, 2014)

Appendix C: What Marketing Technology Buyers Need

What Marketing Technology Buyers Need

GROUP	KEY NEEDS	REPRESENTATIVE TECHNOLOGIES
CMO and other marketing leadership	Focus on all aspects of marketing. Key areas include measurement, strategy and marketing optimization.	> Marketing performance management > Marketing mix modeling > Attribution
Brand marketer	Focus on building the brand and creating compelling brand content. Work with agencies, media buying firms and creative shops.	> Brand measurement > Marketing resource management (planning) > Asset management and localization
Marketing operations	Central organization that focuses on budgets, processes, vendor relationships and fulfillment.	> Marketing finance management > Marketing resource management (workflow) > Production and fulfillment management
Relationship marketers	Emphasize customer insight development and direct communications.	> Descriptive and predictive analytics > Campaign mgmt. and marketing automation > Interaction mgmt. and contact optimization > Event-based marketing
Interactive marketers	Focus on digital advertising, interactive marketing and emerging media strategy.	> Email, search, display, social and mobile > Web analytics and online testing > Behavioral targeting and recommendations > Audience management

Data: Forrester Research
Source: InformationWeek, Feb 11 2013

(Henschen, 2013)

Adding Value: Online Student Engagement

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Abstract

This paper seeks to add to the emerging literature related to online student engagement with additional suggestions for instructional strategies. Student engagement is one of the tenets of effective online instruction; as such, particular attention to how it adds value to student learning is crucial and worth the time and effort to enhance learning outcomes. What strategies and technology enhance student engagement and add value to student learning? Continuing research into online student engagement strategies is needed to add value to student learning.

Keywords: student engagement, online teaching, instructional strategies, engagement using technology

The purpose of this paper is to reinforce how student engagement adds value to teaching and student learning in the online environment. The roots of student engagement are driven by the desire to enhance student learning and success.

Four elements are included in this paper: student engagement research, online teaching, instructional strategies, and how technology may be used to engage students with the course content. The first area, student engagement, includes a definition and a cursory review of literature that sets the foundation for the other three areas.

1. STUDENT ENGAGEMENT

"Tell me and I forget. Teach me and I remember. Engage me and I learn." – Chinese Proverb

Student engagement has been a topic of concern since the first classroom was set up. However, formal research into student engagement was only conceptualized in the 1980s as a way to reduce boredom, alienation, and dropout rates (Finn & Zimmer, 2013). Fisher & Berliner's (1985) study of engaged time for improving student achievement also made a strong contribution. Models of student engagement research have emerged: Newmann (1981) and the role of the school environment; a "self-system process" model, focusing on competence, autonomy, and relatedness (Connell. 1990; Connell & Wellborn, 1991); and the participation-identification model (Finn, 1989), focusing on quality of instruction and student abilities. Newer models focusing on academic engagement, social engagement, cognitive engagement, and affective engagement have added four important dimensions to student engagement (Appleton, Christenson, Kim, & Reschly, 2006; Darr, Ferral, & Stephenou, 2008; Fredericks, Blumenfeld, & Paris, 2004; Jimerson, Campos, & Greif, 2003; Libbey, 2004; Luckner, Englund, Coffey, & Nunn, 2006; Rumberger & Lim, 2008).

The participation-identification model as espoused by Finn (1989) has particular application to student engagement with the content since student behaviors related to learning, such as paying particular attention to the teacher, responding to teacher's questions, completing assignments, taking the initiative to look at materials differently, and engaging in extra activities, enhance student learning and achievement. Additionally, social and emotional

factors (attending class, following guidelines, and belonging) play a strong role in Finn's model. Later research by Finn, Pannozzo, & Voelkl (1995) has reinforced the efficacy of this model.

As research has shown, how to keep student focus on the course content remains a key element in student learning and teacher planning. The refocus on student engagement in later research has been exacerbated as the result of the introduction and proliferation of online courses. Student engagement again has become front and center of course planning and implementation.

Definition

As reported in the *Handbook of Research on Student Engagement,* Christenson, Reschly, & Wylie, Eds., 2013, no one single definitive, operational definition of student engagement is forthcoming. However, various definitions include typologies of behaviors coming out of research by Fredericks, et.al, 2004, who state that student engagement is "multidimensional, interrelated, observable behavior, internal cognition, and emotion."

Another study defined engagement as a way to embrace active and collaborative learning, participation in challenging academic activities, formative communication with academic staff, involvement in enriching educational experiences, and feelings legitimated and supported by university learning communities (Coates, 2007).

For purposes of this paper, student engagement will be defined as the intention of a student to participate in a learning activity as loosely defined by Connell & Wellborn, 1991 and as reinforced in the participation-identification model detailed by Finn, 1989. The learning activity should include observable behavior that affects the internalization of the content, with social and emotional implications and an intentional decision to engage.

Why does Student Engagement Matter?

In order for instructors to choose instructional strategies and activities, a student engagement perspective is needed. The reasons for this include the following factors as proffered by Finn & Zimmer (2013):

- Engagement behaviors should be understood as essential to learning (not just "busy" work)
- Engagement behaviors parallel later behavior; e.g., they are directly relatable to "on and off the job behavior" (connecting to the appropriate work place)
- Remaining engaged (persistence) is an outcome of being in school (value is seen in completing the activity)
- Engagement behaviors have the possibility of improving academic achievement (the value of learning is reinforced). Additionally, student engagement behaviors have adjusted instructional dimensions and outcomes for social and emotional learning that provide motivation to learn and achieve. Students are able to identify with the activity and "see" the value for themselves.

Understanding student engagement is a way to improve student learning and enhance significant payoff for students. Choosing and manipulating instructional strategies to engage students shows a great deal of planning for student success.

The attention to student engagement as a hot topic is timely due to the proliferation of online courses and programs. The challenge in the online environment is how to engage students with the content, with each other, and with the instructor. Finding what works for students and instructors in the online environment is critical and crucial to enhancing not only learning but improving the feelings toward online learning. The next section focuses on a discussion of e-learning and its continuing growth across all education and training venues.

2. ONLINE TEACHING

E-Learning has revolutionized the educational sector, and has changed the way knowledge and skill acquisition are viewed. Because of modern educational technology, e-learning tools and techniques just keep getting bigger and better. Today, they are providing learners with a more impressive, and more effective, educational experience.

More and more students and employees are using e-Learning to earn their degrees, build upon their current knowledge base, and develop new skills. As such, an increasing number of online courses are now being offered in order to meet the ever-growing demand (eLearning Industry, 2014).

Eight new developments in online learning also were reported in the 2014 eLearning Industry report:

- In 2011, it was estimated that about $35.6 billion was spent on self-paced eLearning across the globe. Today, e-Learning is a $56.2 billion industry, and it's going to double by 2015.
- Corporations now report that e-Learning is the second most valuable training method that they use.
- Today, it is estimated that about 4.6 million college students are taking at least one course online. However, by 2019, roughly half of all college classes will be eLearning-based.
- Over 41.7% percent of global Fortune 500 companies now use some form of educational technology to instruct employees during formal learning hours, and that figure is only going to steadily increase in future years.
- According to a report released by IBM, companies who utilize e-Learning tools and strategies have the potential to boost productivity by up to 50%. For every $1 that company spends, it's estimated that they can receive $30 worth of productivity.
- According to a recent study conducted by The Research Institute of America, e-Learning has the power to increase information retention rates by up to 60%.
- It has been estimated that nearly 25% of all employees leave their job because there simply aren't enough training or learning opportunities. On the other hand, companies who do offer e-Learning and on-the-job training generate about 26% more revenue per employee.
- 72% of companies who were included in a recent survey stated that e-Learning helps them to keep up-to-date with changes in their industry, which helps them to remain competitive within their niche.

For these reasons and others, purposeful attention must be paid to how to engage online learners so that the predictions of its value come true. The next section of the paper focuses on strategies that take into account the factors of student engagement.

3. INSTRUCTIONAL STRATEGIES

> You can't fake farming or teaching.
> *John Soderman, Douglas County, Nevada, Superintendent*

Instructors' course outcomes intention and the manner in which they construct learning activities in the learning environment to meet the outcomes have an impact on student engagement. The online learning environment has an added challenge without face-to-face contact. However, a strong, balanced teacher social presence can make a difference in student engagement (Dixson, 2010). Dixson's findings report that "students identified a number of activities as engaging: application activities (having to apply the concepts to case studies or problem solving), discussion forums about the concepts, labs and group projects, research papers, and current events assignments."

In a presentation at the Quality Matters conference, Jones (2013) offered "support for a strong social presence" in the online environment by presenting the following activities:

- Identify preferred method of communication (e-mail will not work as well with student enrollments of 30+)
- Share response timeline with students
- Post weekly announcements
- Consider having weekly web conferencing meetings (optional meetings may be best)
- Use facilitators – to support more "one-on-one" communications.

In the same presentation, other suggestions from Jones emerged related to "cognitive and emotional" factors:

- Set up course-centered study groups for online courses by providing a group-meeting place (group site, web conferencing, or something similar).
- Explain purpose and expectations of the group site.
- Provide supportive instructional resources (e.g., narrated slides, *YouTube* videos, online research, quick web cam videos)
- Add an introduction message from the instructor at the beginning of each module/unit
- Never use just a PowerPoint/bullet list without an explanation of key points
- Be certain to explain the purpose of the resources (i.e., why the resource is needed or important for students; what they should learn or gain from the resource)
- Provide week by week instructions for individual work needed toward group projects
- Emphasize problem-based learning
- Permit student choice and initiative

- Encourage depth rather than breadth: require student thinking (apply, analyze, evaluate, create)
- Offer multiple levels of challenge
- Design activities to be relevant and authentic

All of the activities cited above have one thing in common: they require *active* learning (defined as focusing the responsibility for learning on students as first cited in a study conducted by Association for the Study of Higher Education [ASHE)] by Bonwell & Eison, 1991) and engaged teaching.

Some aspects of a flipped classroom (a form of blended learning in which students learn new content online by watching video lectures, usually at home; what used to be homework [assigned problems] is now done in class with teachers offering more personalized guidance and interaction with students, replacing the hour-long lecture (Bergmann & Sams, 2012). A connection between students and instructors and students and peers enhance the well being of students in the online environment.

4. ENGAGEMENT USING TECHNOLOGY

Information technology is tightly woven in our personal and professional lives and has made a world of difference in being able to engage students with the instructor, with other students, and with the content. Learning management systems have become increasingly more sophisticated and widely used since their debut in the 1950s and offer a myriad of chances for students to interact with the content, the instructor, and their peers. The National Education Technology Plan 2010 calls for revolutionary changes in education using technologies that engage and empower. The role that technology plays in the classroom depends on district funding and support, teachers' comfort level and knowledge, and knowing how to leverage technology as an instructional tool. Students, on the other hand, have experience with technology that supports multimedia, communication, and network access, and fosters creativity, problem solving, and collaboration experiences—worldwide.

Asynchronous
Robust asynchronous tools—(v) podcasts, mobile apps, Facebook, Twitter, LinkedIn, YouTube, Teacher tube, Pinterest (class or topic bulletin board), Todaysmeet.com (a Twitter-like tool that elicits student comments as a class is in progress), Google Apps, cloud computing, flipped classroom (where both asynchronous and synchronous tools may be used before and during class), smartphones with tablet capability (e.g., notetaking in LectureNotes), tablet computers—all take advantage of content engagement by students in a venue that is appealing and ever-changing. The key to effective use is the choice of content and tool.

Synchronous
Synchronous tools require person to person or persons to persons live interaction. These tools include Skype, online chat rooms (such as Collaborate in Blackboard or Webex, collaborative publishing with wikis and blogs, smartphones, and interactive" notles."

"Notles" (for lack of a better term) are used by the author in a weekly live chat as a way for students to write notes, comments, or answers directly on PowerPoint slides for class participation. In this way, students must come prepared to the live chat by completing readings and/or viewing videos. This approach uses the theory of the "flipped" classroom.

The ultimate synchronous tool will be gamification in the classroom. Thomas & Brown (2011) propose a "learning environment that uses the components of gaming (collaborating, solving problems, creating solutions, acting, and reflecting) for a new culture of learning."

How these strategies and tools are chosen to engage students depends on the subject matter, the course objectives and outcomes, the instructor's comfort with the tools, and the students' willingness to invest interest and time to realize a return on investment. The value is added when strategies and tools are useful to prepare students for jobs, advancement, lifelong learning, and self-worth. Emerging research related to online instruction is the topic of the next section.

5. RESEARCH FINDINGS RELATED TO ONLINE INSTRUCTIONAL STRATEGIES

Research studies into student engagement in the online learning environment will provide insights into whether the instructional strategies noted here are being put to use and with what results. Several studies are included here.

The National Survey of Student Engagement (NSSE) Annual Results 2014 are based on nearly 335,000 census-administered or randomly sampled first-year and senior students attending 568 U.S. bachelor's degree granting institutions

that participated in NSSE in spring 2013 and reported in 2014. Four areas of engagement were surveyed: academic challenge, learning with peers, experiences with faculty, and campus environment Specific findings related to the four areas are highlighted here:

- Effective learning strategies were more frequently used by "students who were older, enrolled part-time, or taking all their coursework online, and were associated with higher self-reported college grades."
- On average, "seniors in engineering and biology were most engaged in collaborative learning, while their peers majoring in arts and humanities, social sciences, and social service professions were engaged in collaborative learning the least."
- Students taking all of their courses online were "significantly less engaged" in collaborative learning.
- Seniors majoring in arts and humanities observed the "highest levels of effective teaching practices by instructors, while those in STEM fields – especially engineering – observed the lowest levels of teaching practice."
- About "one student in ten" never met with an academic advisor during the academic year.
- Students report "learning with peers as sometimes and often" helpful.
- Both "learning with technology and courses that improved students' understanding and use of technology" had a positive association with all four of the NSSE academic challenge indicators.

Dixson (2010) sought to discover what activities and/or interaction channels might be expected to lead to more highly engaged online students. After first creating a scale to measure online student engagement, and then surveying 186 students from six campuses in the Midwest, the results indicate "no particular activity will automatically help students to be more engaged in online classes." However, the results also suggest "multiple communication channels may be related to higher engagement and that student-student and instructor-student communication are clearly strongly correlated with higher student engagement with the course, in general." Thus, advice for online instructors is still to use active learning but to be sure to incorporate meaningful and multiple ways of interacting with students and encouraging and requiring students to interact with each other.

A study by Baker (2010) sought to examine instructor immediacy and presence in an online learning environment in relation to student affective learning, cognition, and motivation. The study found "a statistically significant positive relationship between instructor immediacy and presence and also found that the linear combination of instructor immediacy and presence is a statistically significant predictor of student affective learning, cognition, and motivation. However, it did not find instructor immediacy to be a significant individual predictor; however, it did find instructor presence to be a significant individual predictor." The study also showed that students in synchronous online courses reported significantly higher instructor immediacy and presence.

In order to create a strong sense of community and to help students engage with learning in online courses, instructors need to find ways to help students feel more strongly connected with each other, with the instructor, and with the content to facilitate activities that more actively involve students in their own learning. Instructors who decisively design learning activities to create opportunities for students to learn about each other, thereby decreasing transactional distance and increasing social presence (Robinson & Hullinger, 2008; Rovai, 2002), are likely to improve learners' sense of classroom community. Students from marginalized populations may especially benefit from a sense of belonging and community (Pittman & Richmond, 2008).

Errey & Wood (2011) designed a pilot study to foster an understanding of the factors that influence engagement in undergraduate students in the business school at a regional Australian university. Two focus groups were conducted with the assistance of 22 students enrolled in the major study areas of the school. The information obtained informed the development of an on-line questionnaire aimed at exploring the drivers of engagement and disengagement. Eighty-five students completed the questionnaire, and 67 usable responses were available for analysis—a response rate of 17 per cent, which could be seen as illustrative of student disengagement. However, the findings of the pilot study suggest "the majority of students believed themselves to be engaged with their studies. Students reported that the instructors' approach, class and assignment structure, learning support and other personal factors affected their level of engagement."

Dracup (2012) formulated a study that viewed models of distance education that have "evolved over decades, just in time to collide with modern pedagogies in which communication, interaction, student engagement, and active learning are of critical importance." This paper examines the relevant published literature, looking at online learning activities through the prism of the defining characteristics of today. The number of college students taking online classes continues to grow. Today, nearly 30% of college students are taking at least one online class. The social media technologies encompass a wide variety of Web-based technologies such as blogs, wikis, online social networking, and virtual worlds and communication technologies.

Wang, Lin, Yu, & Wu (2013) compared the effectiveness of different learning environments between interactive Facebook instructional method and non-Facebook instructional method for undergraduate students. Two outcome dimensions were measured: student grades and learning engagement. A pre-test-posttest control group experimental design was used. The experimental group (n=134) received the interactive Facebook instructional method, and the control group students (n=57) received the non-Facebook instructional method. Data pertaining to student Facebook use and activities were also collected. Independent samples t-tests were used to measure significant differences in grades and engagement between the Facebook and non-Facebook classroom contexts. Pearson's correlation coefficient was used to measure the relationships between interactive Facebook instructional method and grades. A linear regression was also performed to analyze the predictors of student grades. Content analyses of samples of Facebook communication exchanges were also conducted. The results revealed that "the experimental group had a significant positive effect on grades and engagement", concluding that Facebook use in instructional method assists students in achieving better grades, higher engagement, and greater satisfaction with the university learning experience. Thus, the authors provide experimental evidence that Facebook can be used as an educational communication and interaction tool to enable faculty to assume a more active and participatory role.

Mokoena (2013) reports on a small-scale study that examined student engagement with and participation in a university online discussion forum site. The main aim of the study was to identify factors that encourage or discourage student participation in the forum. The study involved the tasks posted on the forum site with which students could engage and provide answers. The content of the discussion forums provided data for this study. The study used a post-graduate module with relatively high student numbers offered by an open and distance learning (ODL) institution of higher education in South Africa. A grounded theory approach was used for data analysis. The results show "that participation does not mean that the discussion forums are being used effectively, and it certainly does not indicate that student learning is being enhanced." Discussion forum effectiveness and student interaction are increased "by greater social presence on the part of lecturers, especially in the form of technical support, providing constructive feedback, and by setting clear expectations to help students understand what is expected of them."

A paper developed by Maloy, Edwards, & Evans (2014) describes utilizing wiki technology, small group workshops, and reflective writing assignments to "flip" a community engagement/service-learning course for college undergraduates who are tutoring culturally and linguistically diverse students in K-12 schools. Flipped classrooms are gaining popularity in the teaching of science, accounting, and other traditionally lecture-based college courses. In this flipped structure, in-class faculty lectures and presentations were replaced by assignments in a wikispace featuring multimodal resources that students hear, view or read, and write about weekly. During class, students rotated through a series of three learning workshops facilitated by faculty and student leaders. Conclusions and recommendations from the study included the following:

- Wikis are an effective flipped course technology. Flipping a college class would not be possible without the capacity of computers and the Internet to create anywhere/anytime learning through vodcasts and podcasts, interactive websites, and access to multimedia resources. Technology enables shifting much of the information presentation function of teaching to online audio or video lectures and presentations, PowerPoint or Prezi slides, and other relevant learning materials.
- Implement a flipped classroom approach one feature at a time. It has taken several semesters to flip the Tutoring in Schools course.

Tromba (2013) reported on the use of a popular online game as a tool for learning. It also brought into stark relief the misconceptions many career educators have regarding gaming in education. Peter Tromba, formerly a science, math, and computer teacher before becoming a middle and high school principal in Eugene, Oregon, "describes an experiment in which Minecraft gaming was used to improve student achievement, and along the way it was discovered that computer gaming presents a challenge and opportunity to improve both learning and class attendance." (Although Tromba's experiment was not conducted in higher education, the implications for the use of video games at this level are far-reaching.)

Interaction is crucial to student satisfaction in online courses as espoused in a study by Martin, Parker, & Deale (2012). Adding synchronous components (virtual classroom technologies) to online courses can facilitate interaction. In this study, interaction within a synchronous virtual classroom was investigated by surveying 21 graduate students in an instructional technology program in the southeastern United States. The students were asked about learner-learner, learner-instructor, learner-content, and learner-interface interactions. In addition, the academic, social, and technical aspects of interactions were examined in three course archives using Schullo's (2005) schema. Participants reported "that the Wimba interface was easy to use and that various features, such as text chat and the webcam, facilitated interaction among the students and with the instructor in the virtual classroom." The importance of students' ability to receive immediate feedback and their experience as presenters was highlighted across the various kinds of interaction. The instructor's teaching style and visual presence were "instrumental in engaging students with the content." The results suggest that student interaction, and hence learning, were aided by the live communication that occurred through the virtual classroom. This study has implications for those who are teaching in the online environment and want to expand their repertoire of teaching strategies.

6. CONCLUSIONS

Early research in student engagement focused on K-12 students. The focus on engaging students has set the foundation for research emphasis and concern for enhancing achievement, persistence, and success for students in online courses in higher education. With the advent of online instruction and the increase in instructional technology tools (especially social media), the need to engage students with the content, with peers, and with instructors becomes even more crucial.

Research is emerging that underscores the value of asynchronous and synchronous tools to enhance learning, social interaction, content immersion, self-efficacy, and community building. The choice of asynchronous or synchronous tools depends on course content, student outcomes, and instructor vision. Student engagement becomes an important element of course and lesson planning so that the value of the content, the tools, and outcomes lead to making one's way in workplaces that are embracing lifelong learning and working in communities that are more virtual.

Several areas for future research into student engagement in the online environment could further the discussion:

1. Which online instructional tools work best for specific academic areas?
2. Partial results of the NSSE 2014 report revealed that students taking all of their courses online were "significantly less engaged" in collaborative learning. Why this occurs should be followed up with more research.
3. How can students be more engaged and collaborative with each other in the online environment? Which tools work best to make interaction happen?
4. How is online teaching and learning elevated in the minds of its users and critics to recognize its value as a legitimate delivery system? Although this topic was not included in this paper, it is the hidden unanswered question for online instructors.
5. Emerging technologies offer the promise of "reaching" teachers and learners. What are these technologies and how will they be used to engage learners?

Continuing research into student engagement and its dimensions in online learning and its tools and strategies is needed to further define the best use of tools and strategies to add value to students' learning and preparation for an ever-changing workplace.

7. REFERENCES

Appleton, J., Christenson, S., Kim, D., & Reschly, A. (2006). Measuring cognitive and psychological engagement: Validation of the

student engagement instrument. *Journal of School Psychology, 44.* 427-445.

Baker, C. (January, 2010). The Impact of Instructor Immediacy and Presence for Online Student Affective Learning, Cognition, and Motivation. *The Journal of Educators Online*, 7 *(1)*, 1-30.

Bergmann, J. & Sams, A. (2012). *Flip Your Classroom: Reach Every Student in Every Class Every Day.* Washington, D.C.: ISTE; Alexandria, VA: ASCS.

Bonwell, C.; Eison, J. (1991). Active Learning: Creating Excitement in the Classroom AEHE-ERIC Higher Education Report No. 1. Washington, D.C.: Jossey-Bass. ISBN 1-878380-08-7.

Christenson, S. L.; Reschly, A. L.; & Wylie, C. Eds., 2013, *Research on Student Engagement.* New York: Springer.

Coates, H. (2007). *Student Engagement in Campus*-Based *and Online Education: University Connections***.** EBook retrieved on June 12, 2014, from http://books.google.com/books?id=smcFiaZcP-0C&dq=Coates+and+student+engagement&lr=**.**

Connell, J.P. (1990). Context, self and action: A motivational analysis of self-system processes across the life span. In D. Cicchetti & M. Beeghly (Eds.), *The self in transition: Infancy to childhood* (61-97). Chicago: University of Chicago Press.

Connell, J.P & Wellborn, J.G. (1991). Competence, autonomy, & relatedness: A motivational analysis of self-esteem processes. In M.R. Gunnar & L.A. Sroufe (Eds.), *Self-process and* development*: The Minnesota symposia on child development* (Vol. 23, 43-77). Hillsdale, N.J.: Erlbaum.

Darr, C., Ferral, H., & Stephenou A. (2008, January). *The development of a scale to measure student engagement.* Paper presented at the Third International Rasch Measurement Conference, Perth, Western Australia.

Dixson, M. (June 2010). Creating effective student *engagement* in online courses: What do students find engaging? *Journal of the Scholarship of Teaching and Learning,* (10), *2*, 1-13.

Dracup, M. (2012). Designing online role plays with a focus on story development to support engagement and critical learning for higher education students. *Journal of Learning Design.* 5*(2).* 12-24.

ELearning Industry Report. (2014). 10 eLearning Statistics for 2014. Retrieved on June 11, 2014, from http://elearningindustry.com/top-10-e-learning-statistics-for-2014-you-need-to-know.

Errey, R. & Wood, G. (2011). Lessons from a student engagement pilot study. *Australian Universities Review,* 53*(1).* 21-34.

Finn, J. (1989). Withdrawing from school. *Review of Educational Research, 59,* 117-142.

Finn, J., Pannozzo, G., & Voelkl, K. (1995). Disruptive and inattentive withdrawn behavior and achievement among fourth graders. *The Elementary School Journal, 95,* 421-434.

Finn, J. & Zimmer, K. (2013. Student Engagement: What Is It? Why Does It Matter? In S. Christenson, Reschly, & Wylie (Eds.), *Handbook of Research on Student Engagement* (97-131). New York: Springer.

Fisher, C. & Berliner, D. (1985). *Perspectives on instructional time.* New York: Longman.

Fredericks, J., Blumenfeld, P., & Paris, A. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74,* 59-109.

Friedman, L. & Friedman, H. (2013). Using Social Media Technologies to Enhance Online Learning. *Journal of Educators Online, 10*(1), 1-21.

Jimerson, S., Campos, E., & Greif, J. (2003). Toward an understanding of definitions and measures of school engagement and related terms. *California School Psychologist, 8,* 7-27.

Jones, P. (2013). *Steps to support student engagement in online courses with large enrollments.* Paper presented at the 2013 Quality Matters 5th Annual Conference.

Accessed on June 11, 2014, from https://www.qualitymatters.org/steps-support-student-engage-ment-online-courses-large-enrollments.

Libbey, H. (2004). Measuring student relationships to school: Attachment, bonding, connectedness, and engagement. *Journal of School Health, 74,* 274-283.

Luckner, A., Englund, M., Coffey, T., & Nunn, A. (2006). Validation of a global measure of school engagement in early and middle adolescence. In M. M. Englund (Chair). *Adolescent engagement in school: Issues of definition and measurement symposium* conducted at the biennial meeting of the Society for Research on Adolescence, San Francisco, CA.

Maloy, R., Edwards, S., Evans, A. (2014). Wikis, Workshops and Writing: Strategies for Flipping a College Community Engagement Course. *Journal of Educators Online.* 11*(1).* 1-23.

Martin, F., Parker, M., Deale, D. (June 2012). Examining Interactivity in Synchronous Virtual Classrooms. *International Review of Research in Open and Distance Learning, 13(3).* 228-261.

Mokoena, S. (April 2013). Engagement with and participation in online discussion forums. *The Turkish Online Journal of Educational Technology.* 12*(2)*. 97-105.

National Education Plan, 2010. Accessed on June 12, 2014, from http://www.ed.gov/technology/netp-2010.

National Survey of Student Engagement (2014). Retrieved on June 11, 2014, and December 30, 2014, from http://nsse.iub.edu/html/annual_results.cfm

Newmann, F. (1981). Reducing student alienation in high schools: Implications of theory. *Harvard Education Review. 51.* 546-564.

Pittman, L., & Richmond, A. (2008). University belonging and friendship quality during the transition to college: Links to self-perceptions and psychological symptoms. *Journal of Experimental Education, 76*, 343-361.

Robinson, C. & Hullinger, H. (June 2008). New benchmarks in higher education: Student engagement in online learning. *Journal of Education for Business.* 84*(2)*. 101-109.

Rovai, A. (April 2002). Building a sense of community at a distance. *The International Review of Research in Open and Distance Learning,* 3*(1).* n.p.

Rumberger, R., & Lim, S. (2008). *Why students drop out of school: A review of 25 years of research* (Project Report No. 15. Santa Barbara, CA: University of California, California Dropout Research Program.

Schullo, S. (2005). An analysis of pedagogical strategies: Using synchronous web-based course systems in the online classroom (Unpublished dissertation). University of South Florida.

Thomas, D. & Brown, J. (2011). *A new culture of learning: Cultivating the imagination for a world of constant change.* Self-published by Douglas Thomas and John Seely Brown, 2011, ISBN 13-978-1456458881.

Tromba, P. (June/July2013). Build engagement and knowledge one block at a time with Minecraft. *Learning & Leading with Technology.* 21-23.

Wang, J., Lin, C., Yu, W., Wu, E. (2013). Meaningful *engagement* in Facebook learning environments: Merging social and academic lives. *Turkish Online Journal of Distance Education*. 14(1). 302-322.

Other Resources

Barkley, E. (2011). Student *Engagement Techniques: A handbook for college faculty.* San Francisco: Jossey-Bass.

Christenson, S., Reschly, A, Wyllie, C. Eds. (2013). *Handbook of Research on Student Engagement.* New York: Springer.

The International Review of Research in Open and Distance Learning. May be accessed at http://www.irrodl.org/index.php/irrodl/ind

A Systems Analysis and Design Case Study for a Business Modeling Learning Experience for a Capstone CIS/IS Systems Development Class

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Abstract

The goal is to provide a robust and challenging problem statement for a capstone, advanced systems analysis and design course for CIS/MIS/CS majors. In addition to the problem narrative, a representative solution for much of the business modeling deliverables is presented using the UML paradigm. A structured analysis deliverable will be the topic of a second paper on this subject. The authors teach the systems analysis and design course(s) or the systems development course(s) at their university. The CIS senior capstone course that the primary author teaches requires that the student complete one or more business modeling case studies. The authors have used some cases/problem statements from various systems analysis and design texts; however, the authors wanted a problem statement that would challenge a systems team at the senior undergraduate level to produce a complete static, functional and behavioral business model that could be designed and implemented. The authors believe that the narrative should include enough detail to enable the team to use either Unified Modeling Language (UML) or Structured Analysis.

Keywords: static model, structural model, functional model, behavioral model, project, tasks, teams, and team members.

1. INTRODUCTION

The goal of this paper is to develop a case study (i.e., problem statement) and a Unified Modeling Language (UML) solution for an automated system that will 1) create and track projects, 2) assign teams to projects, 3) assign tasks to teams, 4) assign the most qualified team members to the teams, and 5) address project costing. This business system for Premier Consulting, Inc. will be titled "Automated Project Management and Scheduling." The scenario of this case study begins with the Chief Information Officer (CIO), which might be played by the instructor of the course, who approves and initiates a project and instructs the Project Director to create teams. This new case study is destined to be used in the Advanced Systems Analysis and Development capstone class. Either a multiple team approach or single team approach will be used in developing a solution depending upon the number of student in the class. Different teaming scenarios are presented in the conclusion to this paper.

Developing a collaborative learning environment is critical to the success of any IT/IS curriculum (Davis, Feinstein, Gorgone, Longenecker & Valacich, 2002). Also, an excellent study discusses the collaborative teaming approach in detail (Ewusi_Mensah, Seal, & Abraham, 2003). Developing a quality case study for this important capstone class drove the authors to develop the case study that follows.

2. THE CASE STUDY

Background

The new automated system is destined to replace the current, manual, error-prone process. The automation of this activity has been welcomed by management for quite some time with the anticipation of significantly reducing the company's expenses. It is hoped that this reduction will be accomplished by 1) creating more successful teams working with greater precision, 2) completing projects on time and within budget due to a better understanding of system requirements and tasks to be completed, and 3) starting projects on time as a result of the automated project scheduling system.

Systems Requirements Statement

- The Project Director creates a project and a "project profile" for each project. The creation of the project profile will require the determination of project employee costs, the assignment of tasks to the project, and the assignment of a project manager. Examples of various tasks are: 1) "prepare cost-benefit analysis report", 2) "produce entity relationship diagram", 3) "produce class diagram", etc.). Once created, the project profile will consist of project id, project personnel cost, a list of tasks assigned, and the project manager.
- The Project Director also creates the teams for a given project, assigns employees to the teams, and assigns a team leader.
- The Project Manager is responsible for assigning tasks to the various teams working on the projects(s).
- The Team Leader assigns tasks to the team members. For all intents and purposes, the various team leaders in the class will mimic this because they are also responsible for assigning tasks to their team members working on this case (automating these activities).

Figure 1 (in the Appendix) illustrates this hierarchy.

Additional functionality includes:

- Retrieve and update information about various software projects.
- Retrieve and update information about various project teams.
- Provide information about specific team member assignments.
- Provide information that allows for better assignment of team members to specific teams.
- Provide information about the location of projects, teams assigned, and members assigned to the various teams, and what the team member skill sets are.
- Perform function point analysis computations to determine the personnel cost of the project to be created. This activity would be part of the process of creating the project.
- Provide project costing information to Accounting so that the client can be invoiced upon completion of project phases. The costing information will be determined from the function point analysis study alluded to above.
- Retrieve projects and indicate which tasks have been completed and what tasks that are currently being worked on by each project. This is expanded upon later.

The Static/Structural Model

Premier Consulting Incorporated is a global organization. A branch office can be either a foreign or domestic office and has a branch manager. Both the foreign and domestic branch offices will oversee their respective regional offices and each regional office oversees district offices. Each regional office will have a manager. Each district office will have a manager. A district office may sometimes oversee departments but not always. The departments may include areas such as recruiting, training, research, and development. Each department will have a manager. The automated system needs to be able to report on information for the branches, regions, and districts. This information would include data about their branch, region and district; identification number, name, address, phone, and manager name.

A department may have one or more employees. An employee may be assigned to

one or more teams; a team may consist of several employees. However, it is possible for a team to consist of a single employee. A team will never have zero employees; thus requiring that at least one team member be assigned upon team creation. An employee can be classified as either regular staff or a consultant. Regular staff will draw a straight monthly check. A consultant is paid by the hour and receives time and half pay for hours over 40. Regular staff receives health benefits and pay social security tax (FICA). Consultants do not receive health benefits nor do they pay FICA.

Premier Consulting Incorporated seeks to improve the quality of the productive work performed by teams; therefore, quality assurance (QA) teams are used to assess the performance of teams on projects completed. The QA teams may consist of one or more regular staff and one or more consultants. Saying it another way, some regular staff and some of the consultants are parts of the QA Team. An exception is that the consultant or staff chosen for the QA Team cannot be on one of the project teams being studied. In other words, he or she cannot be studying or evaluating him/herself.

A project may have zero teams assigned to it initially. The project manager may choose to assign teams to the project at a later date, or choose to assign a team or teams to the project upon project creation. But, the Project Director creates the project profile for the project. A team may be assigned to one or several projects at a time. Typically, a project may involve a multiplicity of teams working at various stages of the project. In other words, the data analysis team could be working on the data-modeling phase of the project while the process analysis team is completing the activity-modeling phase of the project.

Figure 2 (in the Appendix) describes the project, the team, the team member(s), and task relationship. An example of a project is defined here as a project to create an order entry process, with teams assigned, and employees assigned to the teams. A project will consist of one or more tasks, and a task may be assigned to one or more projects. Figure 3 below illustrates this relationship.

The process of assigning tasks to a project is to assist in the creation of a project profile. The project profile data is needed in order to create the teams and to assign the appropriate team members with the correct skill sets to the aforementioned teams. A specific team will be assigned a specific task or tasks, and a task may be assigned to one or more teams. A task is often categorized as programming, systems analysis, systems design, database design, data mining, e-commerce / web-enablement, telecommunications, or hardware design and will include a task difficulty coefficient/rating (1 to 10 – where 10 is the most difficult). Examples of more detailed tasks may include "prepare cost benefit analysis report," "draw ERD," "prepare class diagram", "draw activity diagram for Accept Orders Process", "code client/server web-enabled order system", etc. To summarize, the project is created with a project profile and a project manager. The project profile consists of the project costs and assigned tasks. Projects will be assigned teams. The assigned teams will, in turn, be assigned tasks from the task list associated with the project. Figure 4 (in the Appendix) illustrates this association.

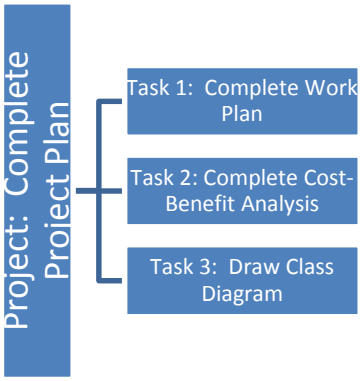

Figure 3: Relationship between Projects and Tasks Assigned.

The company needs to be able to identify what kind of task or tasks a specific team is working on at a specific point in time. In some cases, company management needs to be able to assign a team based on team category (systems analysis, programming, database design, etc.) to a specific task within a project phase and to make sure that the team's expertise rating is high enough to complete a given task's difficulty rating (determined by its difficulty coefficient). In other words, the management wants to make sure talent is matched with responsibility (assigning the most experienced and talented people to the specific task).

A team is limited to seven (7) members, and the team will be assigned specific tasks. The team leader will be responsible for assigning these tasks to specific team members that have been assigned to the team. Once all tasks are completed for that team, the team is dissolved or assigned to another project.

A team will complete a given project, and once the team completes a project, the team is either dissolved or is assigned to another project. A team member is often assigned to another team at that point, but it is possible for a consultant to not be immediately assigned to a team. During this period, the consultant is said to be "on the beach." A staff member cannot be "on the beach." Staff will have regular duties to work on while waiting on another team assignment. The consultant will often attend workshops to sharpen his or her skills in a particular area during this waiting period. The system needs to have the functionality to remove a team from a project and reassign the team to a different project or delete the team altogether. Also, a given task can be reassigned to a different team when management feels that it would promote project completion.

A project will often consist of project phase categories. General information about a phase is discussed below. Project phase categories may include categories such as planning, analysis, design, implementation, testing, and production. It may be important to keep table data about these phases since all projects will fit into one of these categories, and a user may want to print information about the phase such as phase number, phase title, and phase description/comments. A specific phase category may be included on many different projects; and, on the other hand, a project may involve many different project phase categories. A project phase will have a start date and stop date and will include information about the title of the phase (Examples: "Requirements Analysis" or "Object Modeling."

As previously mentioned, the branch office can be categorized as either domestic or foreign. A domestic branch will also include information about the state code, state subdivision (county/parish), and so forth. A foreign branch will also include information about country code, foreign country excise tax, and so forth.

Functional Model
How the Over-All System Interacts with External Entities/Actors. A narrative follows:

"John Reynolds, Project Manager, who works for the Personnel Department and is responsible for providing the right information to the Project Scheduling system. First, John will send a folder of available employees to the Project Scheduling System. Mary Raeger, who also works for Personnel, will provide the system with an official and approved request to create a project. Of course, the client would have sent a system request to the company that would have to be approved first. The business system will produce various reports that are sent to management. One report that is sent to management is a roster of various projects along with the assigned teams and assigned employees. A job report that tracks the number of hours an assigned employee (by team) worked on any given project is sent to accounting for costing purposes. This job report will also be sent to personnel so that a history log can be prepared by the personnel department and sent to the employee on a quarterly basis. An integral part of the system is the actual assignment of the teams to the projects and the assignment of employees to the teams. This is an intricate operation that will calculate project complexity estimates, and provide a project complexity report to the information systems department for review. The validated project complexity estimates will eventually be used as input by the system to actually calculate function points. These estimates will include details about the number and complexity of inputs, outputs, database tables, interfaces, and queries. The system will perform a number of complex correlations and calculations and produce a project assignment report that lists the project, the teams assigned, and assigned employees/consultants for the specific team (s). This report is sent to management and to Information Systems to be distributed to the appropriate project managers."

Major Processes
The system consists of five (5) major processes. The project director must 1) be able to create a project along with its profile, 2) The project director also creates teams for the various projects along with its team leader, 3) The project manager will assign tasks for each team, 4) the team leader will assign specific tasks to a team member, and 5) the system will also

generate special management reports to the CIO.

As previously discussed, the Project Director is responsible for creating the projects, assigning tasks to projects, assigning a project manager, creating and assigning teams to projects, assigning members to teams, and assigning team leaders for each team. One of the first jobs for the Project Manager is to assign tasks to the teams. The Team Leader is responsible for handling the assignment of tasks to individual members on the team and overseeing their completion. While this has been illustrated previously, it's worth mentioning again to highlight the specific processes as they relate to the Project Director, Project Manager, and Team Leader.

As previously alluded to, but with more detail, the process of creating projects will unconditionally require the process of determining a project profile. This process will involve determining the personnel cost of the project and the tasks needed to complete the project.

The process of creating a team will always necessitate the assignment of at least one team member. Assigning team member(s) is a separate process, but will always execute alongside the process of creating the team. In other words, it unconditionally executes.

Behavioral Model

The behavioral aspect of the scheduling system will work as follows: the project director logs on to the Scheduling System with a user id and password. The system will check the authenticity of this information. If correct, the system will present the director with a window/web page. The window/webpage will prompt the project director with a main menu. This main menu should enable the project director to 1) create a new project along with its project profile, 2) create a new team for the project, 3) assign team(s) to a project, and (4) assign members to a team, and 5) Generate Reports.

The project manager logs on the Scheduling System with user id and password.

The system will check authenticity of this information. The manager will be prompted with a menu that will allow him or her to assign tasks to a team. The team leader logs on to the Scheduling System with user id and password. The system will check authenticity of this information. The team leader will assign team tasks to specific team members with associated due dates.

The system should provide an interface to enable the assignment of specific tasks to be assigned to that project. In addition, there should be an option to list all the projects so that a manager can observe sub-form information listing existing teams assigned to the project along with the team members for each team assigned.

Information Steps and Flow

The automated system should enable the Project Director to create a new project by entering a project ID, project description, start date, stop date, and Project Manager. Next the Project Director should be provided a list box to select an existing team to be assigned to the project or a textbox prompt to create a new team for this project. This would include Team ID and Team Description. Subsequently, after creating a new team, the system will display this team information with a prompt to select available employees from a list box. As the Project Director selects an available member, the system will check the member profile for matching skills and availability. If this selection is satisfactory then the member will be placed into a "members selected" list box (essentially a shopping cart.) This process will repeat until the manager is finished selecting potential team members.

This scenario is intentionally left incomplete since a system prototype is required. Some details are left to your discretion and creativity!

Creating the Project

In creating a project, as mentioned above, the system must first determine the "project profile." Next, if the project profile successfully completes, then the system will record the project, and then display the project information to the Project Director.

Next, the system will prompt the Project Director (previously alluded to) with a list of the various project phases for the Project Director to analyze. Then the Project Director will repeatedly select needed phases from the list he or she wishes to be associated with this project.

The system will then take the selected phase as input, and place the phase into a phases assignment list (basically a shopping cart). This will repeat until the Project Director is finished selecting phases for the project. When the system detects that there are no more phases to be selected, the system will list the project name, project duration, and the list of phases required for that project. The system prompts the user that his activity is complete and will then stop. Figure 5 below helps conceptualize this process.

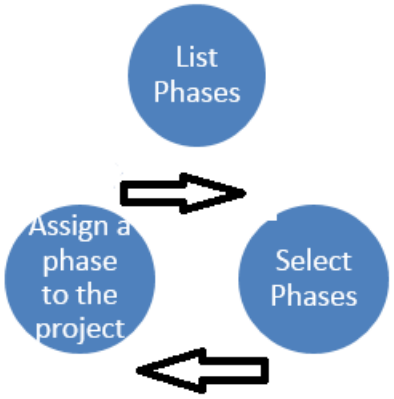

Figure 5: The Activity of Assigning Phases to a Project

The process of determining a project profile requires that the system prompt the Project Director to enter details related to the number and assigned weight of inputs, outputs, tables/files, interfaces, and Queries/Reports, and project complexity points (i.e., how complex is this project relative to other projects?). Once this data has been entered, the automated system will compute a Total Adjusted Function Point (TAFP) amount. If the function points are less than 400 then the system will determine the lines of code by multiplying the TAFP by the lines of code per function point for a particular language or other development framework (located in an array). If the function points are greater than or equal to 400 then the automated system prompts the CIO to complete a request to the Vice President of Finance for additional funding for the project (the project is too big). This may entail the CIO break this project into two separate projects if the VP of Finance grants the funding request. The chart below (Figure 6) illustrates the corresponding lines of code for a particular language.

Using the total lines of code as input, the system will determine the person-months (PM) needed for this project (1.4 X (Lines/1000)). The system will then determine the MONTHS need for the project (3.0 X PM) $^{1/3.}$ The system will then determine the number of PERSONS to assign to the team (MONTHS divided by PM). The system will then compute the personnel COST of the system by multiplying PERSONS by $250 per hour. This does not include materials, computers, servers, and network costs, and the determination of these costs are beyond the scope of this project and not be addressed by the system model. The project director and CIO will manually determine these costs.

Language	Lines of Code / FP
C#	65
JAVA	75
Visual Basic	50
COBOL	70
HTML/CSS/JS/PHP	70

Figure 6: Corresponding Lines of Code Per Function Point for a Designated Language

Assigning Tasks to the Project

Next, the system will repeat a similar dialog with the project director to accept tasks to be performed by the project. This requires the system to display a tasks list, and prompt the project director to select the tasks repeatedly until all tasks have been selected.

Creating the Team

The process of creating teams could involve similar dialog between the Project Director and the system as discussed above (dialog between the Project Director and creating the project). A difference here is that when a team is created it will be required to assign a member to the team. At least one member must be assigned. At least one task must be assigned to the team, but is likely that several tasks will be assigned to the team.

Assigning Tasks to Members

The team leader handles this activity. This process involves a similar scenario as the activity of assigning members to teams, except in this case, the team leader will start by selecting a team member chosen for his/her team; and, subsequently, will choose tasks from a list box and assign those selected tasks to the

selected team member. This process would be repeated until all team members have been assigned the tasks for which they are responsible. This will be communicated to the project manager so that the project manager can assemble a complete Gantt chart and PERT chart for the business system project.

You are encouraged to use your own creativity in augmenting any additional functionality as long as you specify your assumptions.

Deliverables

The student teams will submit:

- A UML functional model and structural model (use case diagram, use case descriptions, activity diagrams for each use case, and a class diagram).
- A UML behavioral model that includes a sequence diagram for each use case and a state transition/machine diagram for at least one complex class for the business rules provided.
- A system design specification that includes an interface/navigation design, database design, and program design.
- The business model must provide sufficient detail to support a systems design effort.
- A prototype that represents the functionality for 1) creating projects, 2) determining the project profile, 3) assigning tasks to the various projects, 4) creating teams, 5) assigning tasks to teams, and 6) assigning tasks to individual, specific members on the team.
- A program module that executes successfully for at least two of the use cases.
- Assumptions may be documented and included with the work.

The UML Solution

The UML solution consists of a number of UML diagrams covering the functional, structural and behavioral models. The authors employed two main textbooks on the subject (Kendall & Kendall, 2012) and (Dennis, Wixom, & Tegarden, 2012). The solution consists of:

1. Normalized class diagram (Figure 7, in the Appendix)
2. Use case diagram (Figure 8, in the Appendix)
3. The use case description for assigning tasks to the team member (Figure 9, in the Appendix)
4. Activity diagrams for:
   a. creating a project (Figure 10, in the Appendix)
   b. activity diagram for creating the project profile (Figure 11, in the Appendix)
   c. activity diagram for creating a team (Figure 12, in the Appendix)
   d. activity diagram for assigning tasks to a team member (Figure 13, in the Appendix)
5. Sequence diagram for creating a project (Figure 14, in the Appendix) and a sequence diagram for each of the other use cases (Figure 8, in the Appendix).

A part of the goal of this paper is to encourage instructors of UML to review and provide the authors with either corrections or suggestions on how to improve the case study and solution. Furthermore, the authors are interested in knowing how others would assign this to classes.

3. RECOMMENDATIONS

Two elements should be considered in a capstone class using this case study: 1) Team formation and 2) Team Deliverables.

Student Team Formation

A discussion of how the instructors form the student teams (Russell, Russell, & Tastle, 2005) follows:

1) The instructor creates the teams.
2) Students from the class submit their anonymous resumes.
3) The students in the class are required to read other student resumes.
4) From having read the student resumes, students will nominate team leaders.
5) From the nominations, the class will choose team leaders.
6) From the pool of anonymous student resumes that remain, the team leaders choose their team members in a "round robin" fashion. This is repeated in until all students are assigned to a team.

While there are real flaws with the approach, at least this approach enables the seniors to grasp the difficulty of choosing people for a team when little is known about them other than what is observed from a resume. Soon the seniors will graduate and become IT professionals having to read resumes and decide who to interview for either an IT position with the company or to

decide if they have the skills for a specific project team.

Team Formation Scenarios

One scenario we are considering is to create a Functional Modeling Team, Structural Modeling Team, Behavioral Modeling Team, and a Software Development Team. Students are assigned to the teams based on their backgrounds ascertained from their resumes. This approach is being considered since it mimics the case on which they are working. This would add an element of realism, but would only work with a small class of approximately 16 to 20 students (i.e., 4 or 5 per team). With larger class sizes the second scenario below might be preferred over this first scenario presented.

A second scenario is to require each team to deliver the entire system. We have used this approach by simply allowing fewer deliverables from each phase. This scenario works better with larger class sizes. The negative aspect is that there is a tremendous duplicity of effort by the teams with the chance of plagiarism between the teams.

If the first scenario is used then selected members from each team will participate in the Software Development Team to implement at least two non-trivial applications. In the second scenario, each team will designate one or two team members to develop the code.

Semester Deliverables and Completion Time Line

Figure 15 (in the Appendix) illustrates the project phase, deliverables and a time line to complete the deliverables. The deliverables are common for a systems project (Dennis, et al.)

Russell, Russell, and Tastle discuss the content of the capstone class in their paper (Russell et al., 2005). Students present the system proposal in Week 8 in front of the class with required PowerPoint slides along with a hard copy that is submitted to the instructor at that time. In Week 16, the system specification is presented in front of the class with a complete PowerPoint presentation. The system design specification presentation involves also demonstrating program functionality using a software development platform.

The student evaluation (Russell et al., 2005) requires a peer-evaluation from each student member on his/her team that is worth 10% of the student's final grade. Team leaders are enticed into becoming a team leader by enabling the team leader to earn 5 bonus points for the semester. A team leader evaluation (Likert Scale) of 5 adds 5 points. A grade of 4 adds 3 points. A grade of 3 adds zero points. A grade of 2 deducts 3 points. A grade of 1 deducts 5 points. This is a sliding scale; therefore, a student must think twice before they choose to be a poor team leader as it can cost him or her ½ letter grade for the semester.

Future Research

The authors plan to use the case study in the capstone class this spring 2015 semester and collect both attitudinal and cognitive data from the students taking the class. We are looking to see how well this new case study is perceived by our seniors, and what impact the case study has on the learning process in our classroom. Variables such as examination score performance and peer evaluation scores will be analyzed and compared to previous semesters. We want to determine the difficulty of the case study compared to a few cases that we have used in the past. Previous semester grades and spring 2015 grades will be collected in this regard. We want to find out if the case study improved specific skill performance in producing various UML diagrams. We are interested in measuring performance differences on exam questions (variables): 1) Drawing Use Case Diagram, 2) Drawing Activity Diagram, 3) Drawing Class Diagram. The overall goal is to continuously improve the IS capstone experience at our university.

4. REFERENCES

Davis, Feinstein, Gorgone, Longenecker and Valacich, (2002), *IS 2002 Information Systems Model Curriculum*, College of Business and Economics, Washington State University, Pullman, WA.

Dennis, A. Wixom B., Tegarden D., (2012), *Systems Analysis and Design with UML Version 2.0: An Object-Oriented Approach*, 4th edition; Chapters 4, 5, and 6 (pages 153 - 247).

Ewusi_Mensah, K, K C Seal, and DM Abraham, (2003), "Developing a Collaborative Learning Facility to Support Advanced Information Systems Courses", *ISECON 2002 Proceedings*, v 20 (San Diego), ISSN: 1542-

7382. Also appears in the *ISEDJ* Journal 2: (13), ISSN: 1545-679X.

Kendall, K. & Kendall, J., (2006), *Systems Analysis and Design*, 8th edition, Chapter 10 (pages 281 - 327).

Russell, J., Russell, B., and Tastle, W., (2004), "Teaching Soft Skills in a Systems Development Capstone Class", *Proceedings of ISECON 2004*. Also appears in the *ISEFJ* Journal 3: (19), August 2005.

APPENDIX

Figure 1: Hierarchy of Project Management and their Functions

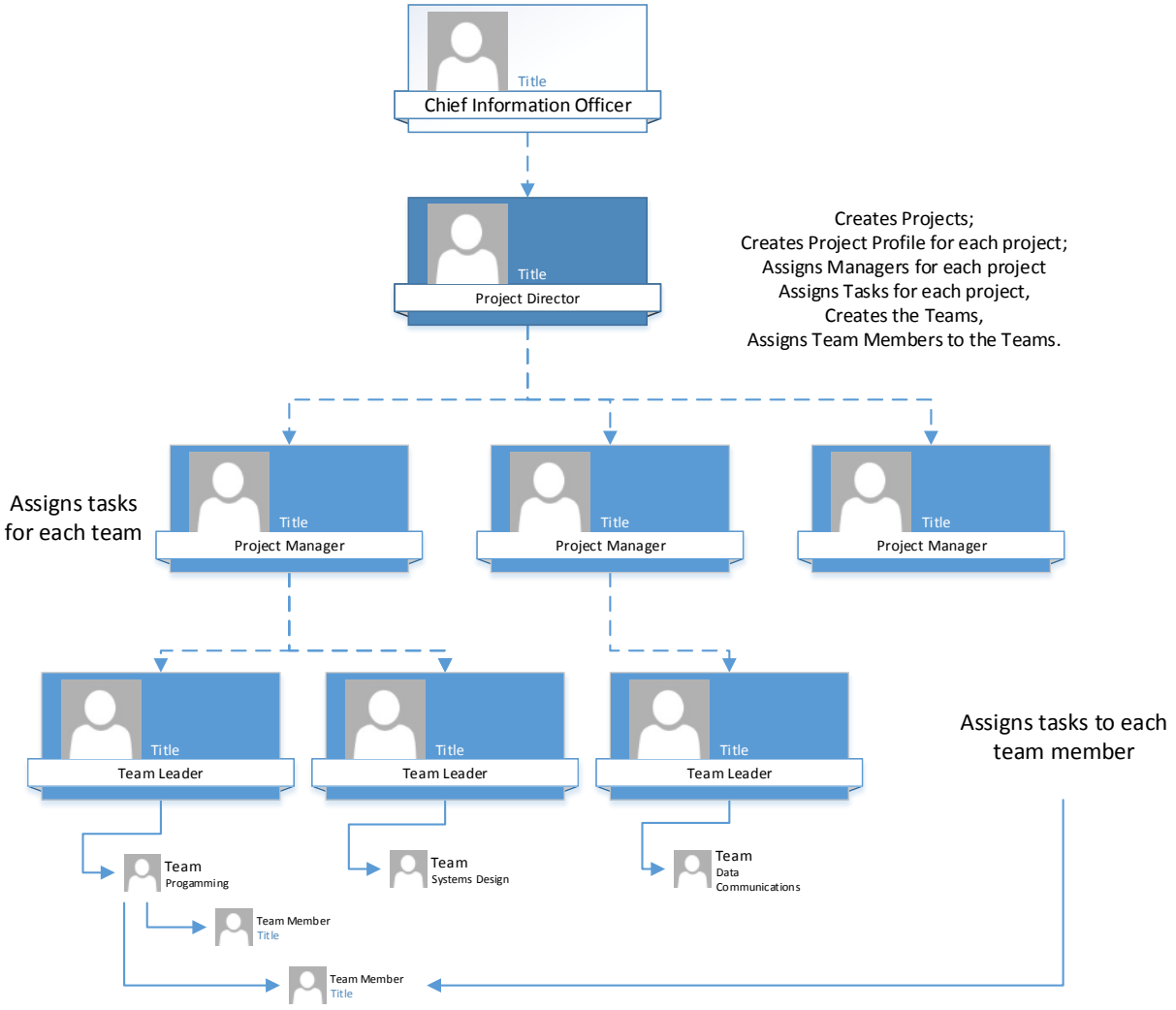

Figure 2: The Relationship Between Projects, Teams, and Team Members

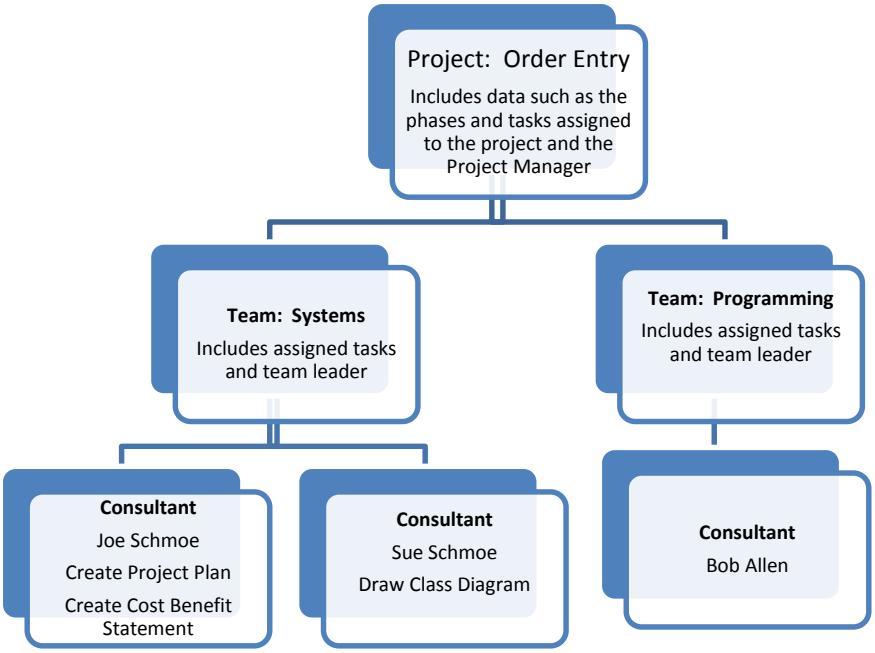

Figure 4: Project Relationship: Project Profile and Teams Assigned

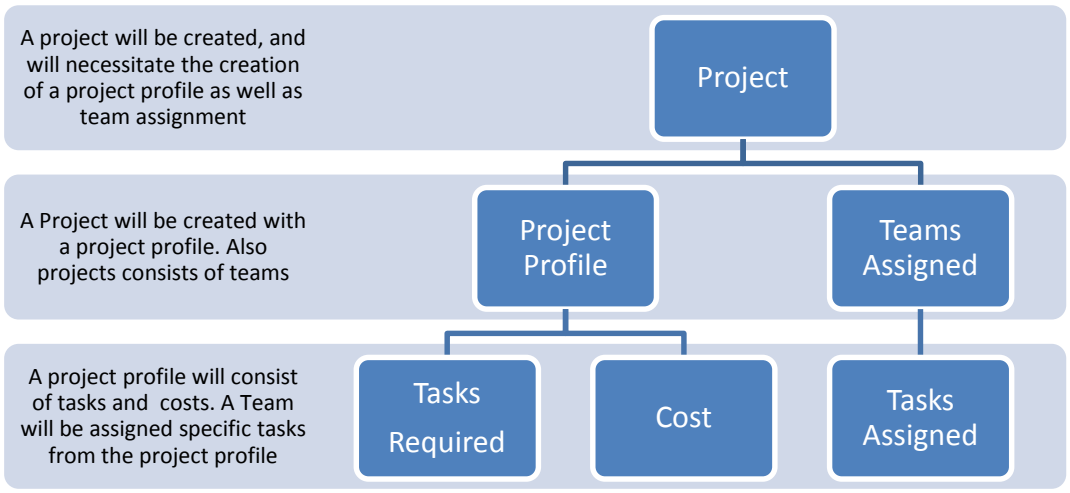

Figure 7: Class Diagram for Premier Consulting

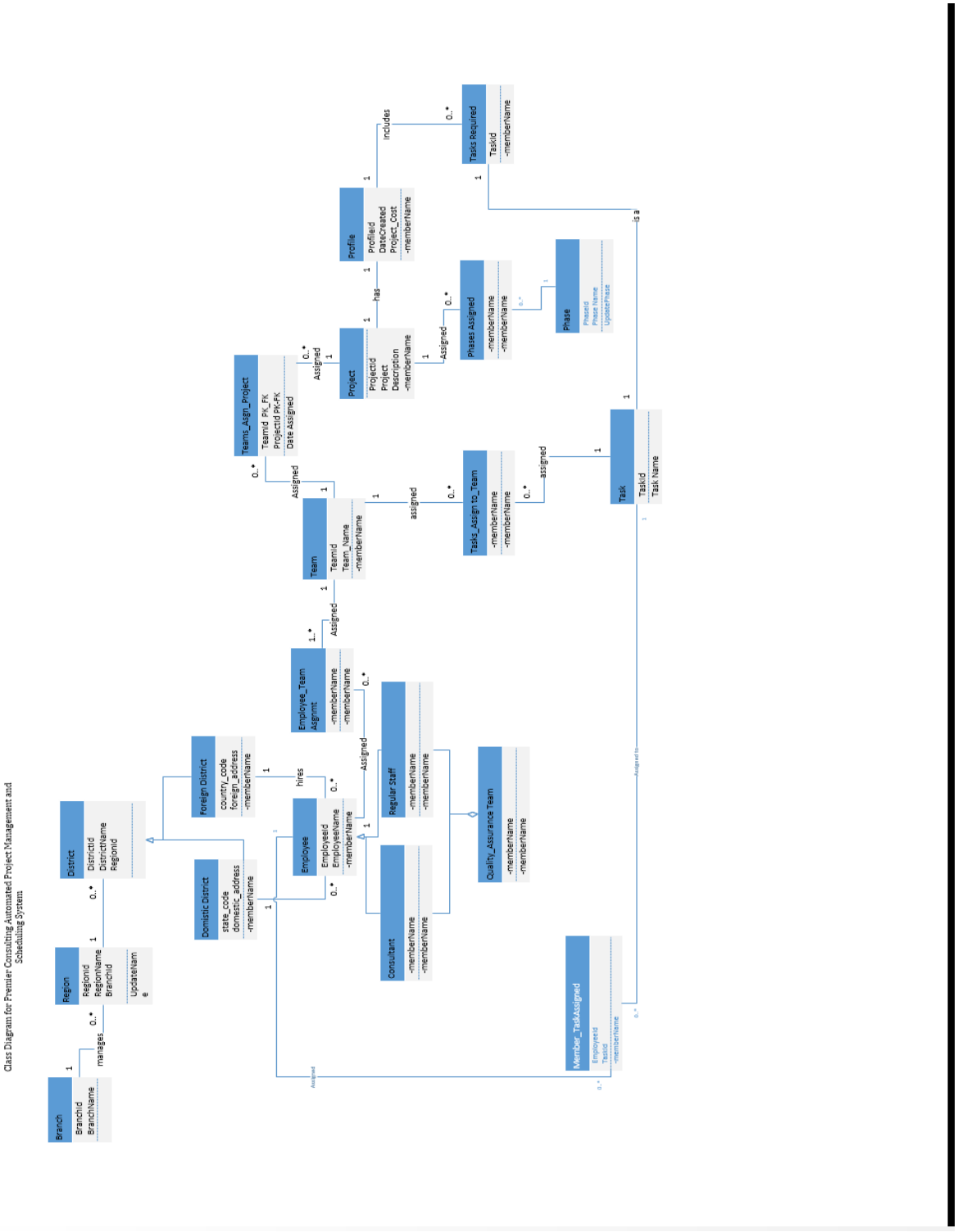

Figure 8: Use Case Diagram for Premier Consulting

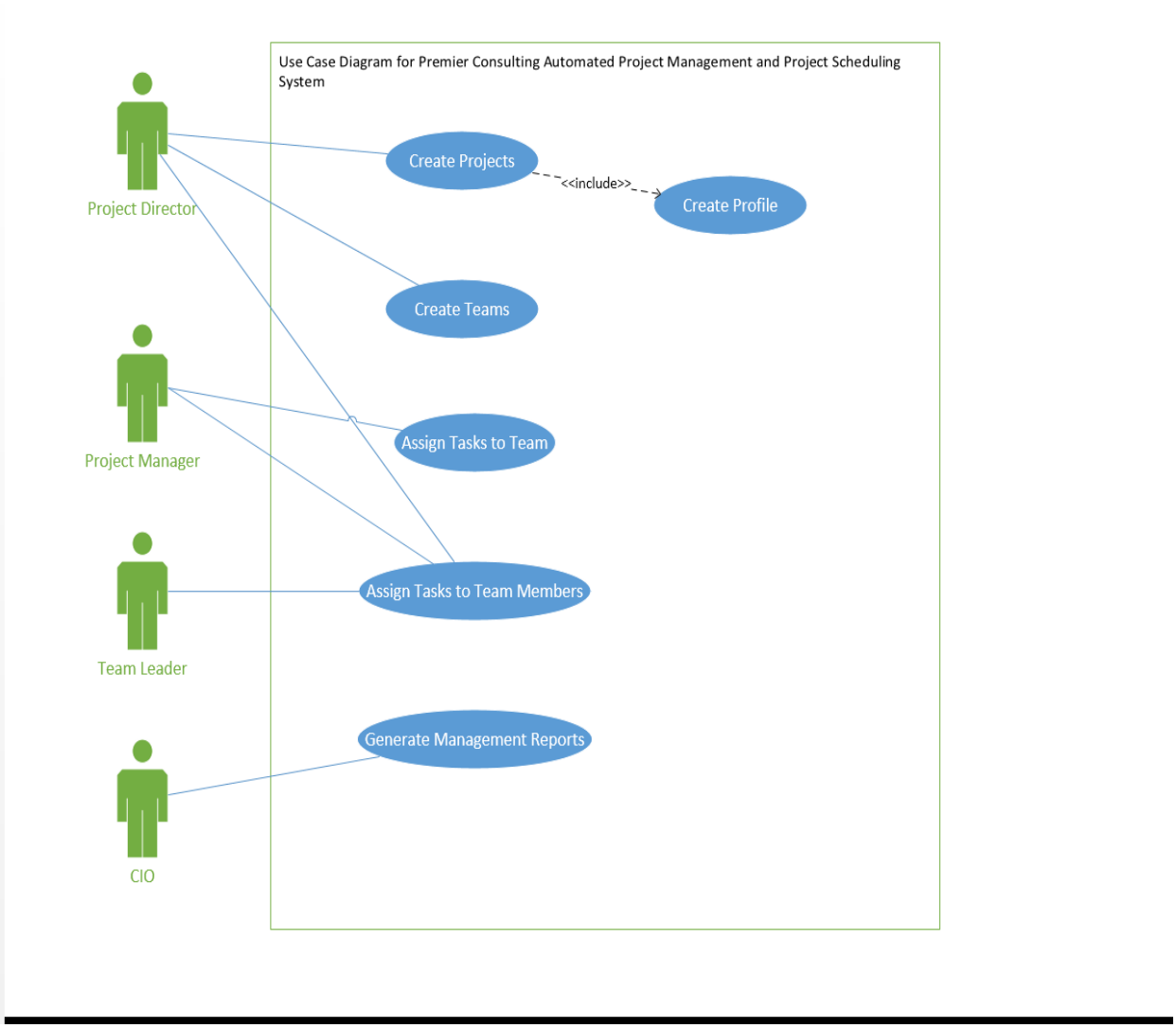

Figure 9: Use Case Description for Assigning Tasks to Team Member

Use Case Name	**Assign Tasks to Team Members**							
Scenario	A responsibility of the Team Leader is to assign tasks to the individual team members on his/her team.							
Triggering Event	Notice from Project Manager to assign tasks to team members.							
Brief Description	The Project Manager notifies the Team Leader that the Project has been created, teams assigned to the project by the Director, and that the Project Manager has assigned the tasks to the team that the team leader is in charge of. The leader is notified that he or she is to assign the various tasks to the individual members on the team.							
Actors	Project Director, Project Manager, Team Leader							
Related Use Cases	Create Project, Assign Tasks to Project, Create Team, Assign Tasks to Team							
Stakeholders	CIO							
Preconditions								
Postconditions								
Flow of Events	**Project Director**		**Project Manager**		**Team Leader**		**System**	
	1		1		1	Enters Logon Information	1	Accepts Logon Information from Team Leader and prompts Team Leader to List Team Members
	2		2		2	Lists the Team Members and selects Team Member to be assigned.	2	Accepts the selected Team Member and Lists the Team Tasks.
	3		3		3	The Team Leader selects a Team Task to be assigned to the Team Member	3	Assigns the selected task to the Team Member (Team Member Task Assignment) Step 3 … …repeats until no more tasks are to be assigned.
	4		4		4		4	Once all tasks are assigned to the Team Members ……the system notifies the Project Manager to assemble the Gantt Chart and Pert Chart
	5		5	Logons on to the system; inputs tasks assigned, and generates a Gantt Chart and a PERT chart. The Project Manager notifies the system that the Gantt and PERT are created successfully.	5		5	The system confirms that the charts are prepared. The system prompts for approval.
	6		6	The Project Manager responds with an approval message.	6		6	If the Project Manager approves the charts then the system communicates this to the Project Director, and lists the Gantt and PERT information to the Director. The system will prompt the Project Director for an approval decision.
	7	Project Director responds to the system prompt with his/her approval decision.	7		7		7	The system accepts the Project Director's response with a message indicating whether the charts were approved or not approved.
Exception Conditions								

Figure 10: Activity Diagram for Create Project Use Case

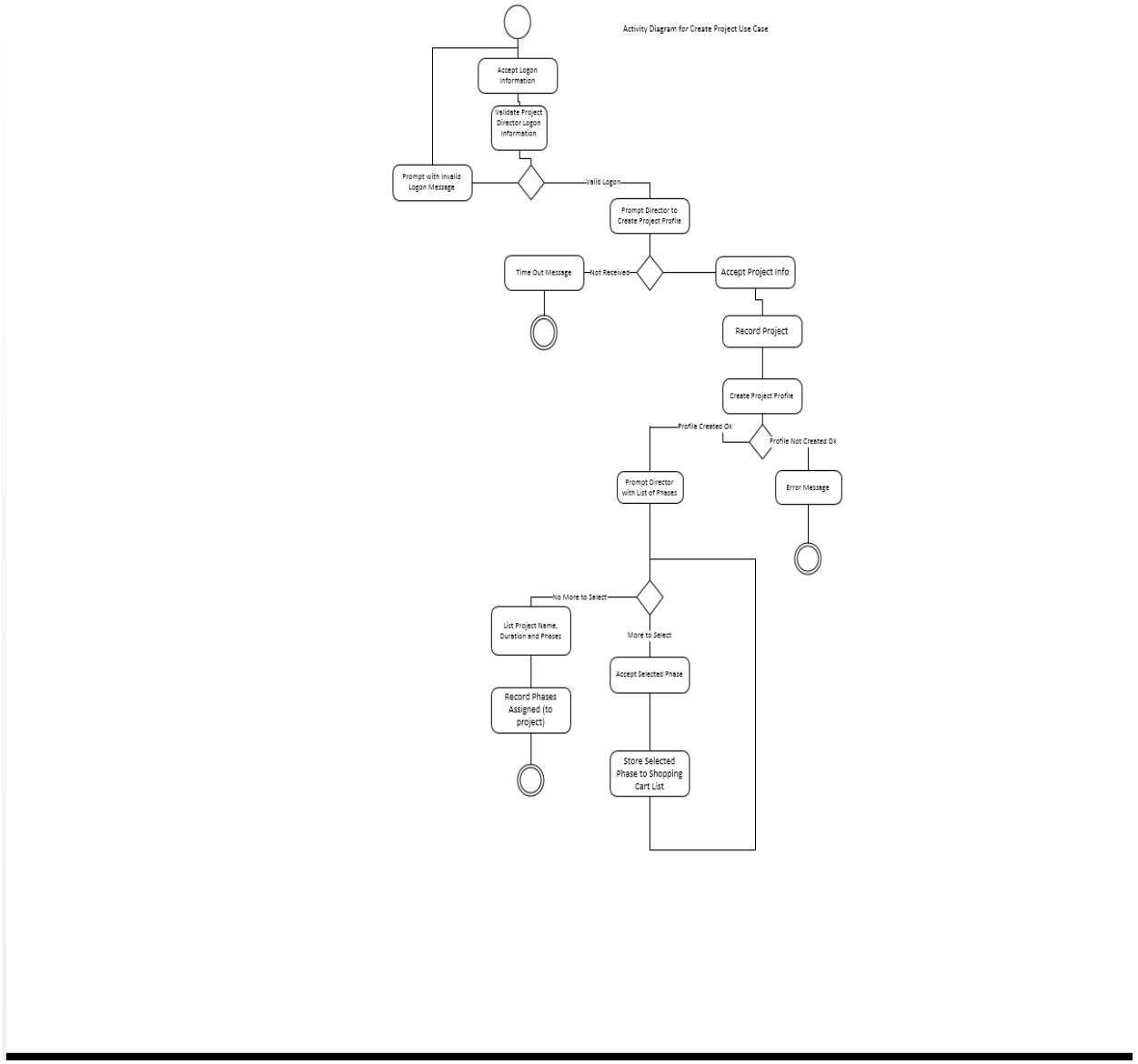

Figure 11: Activity Diagram for Create Project Profile

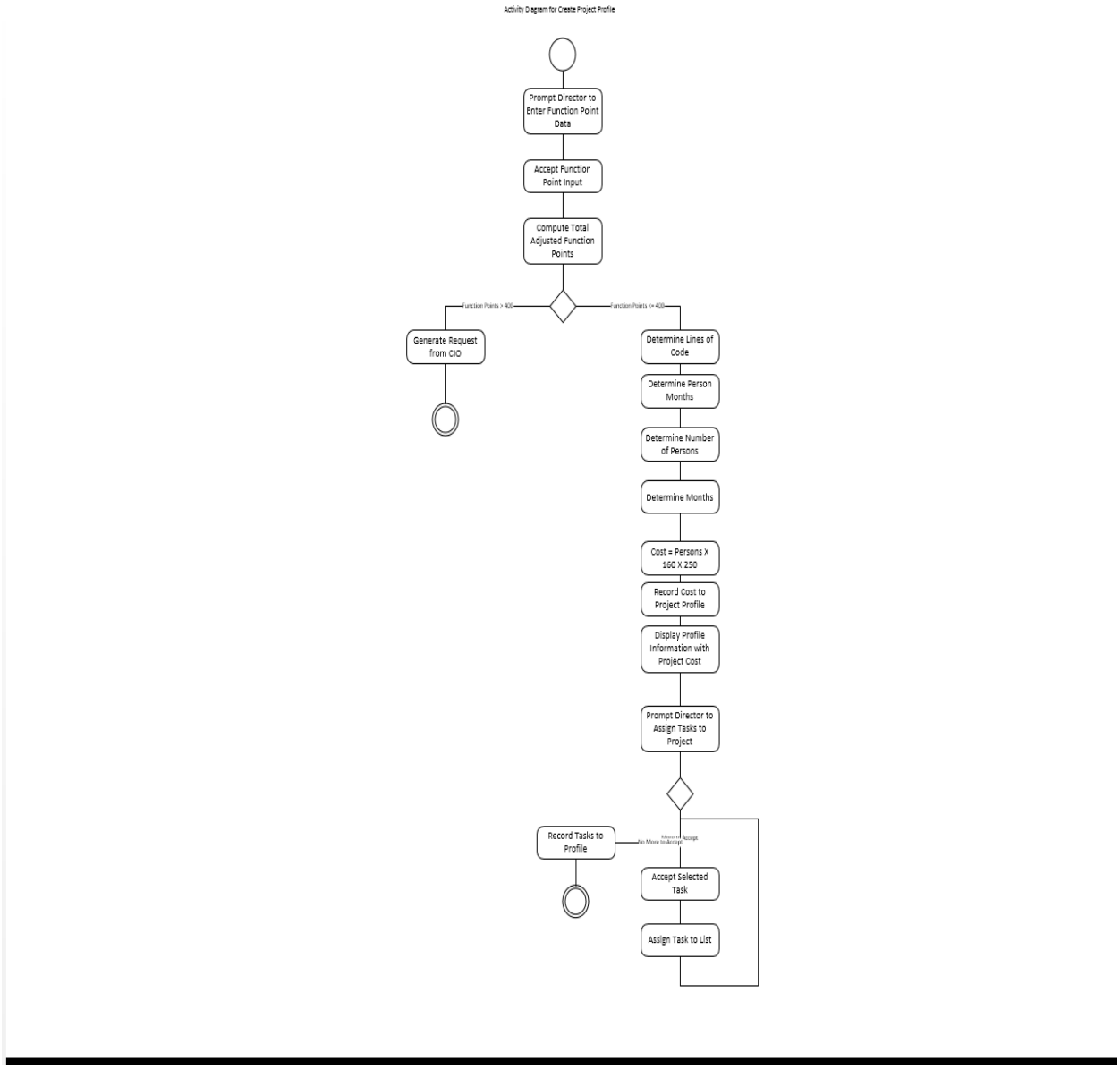

Figure 12: Activity Diagram for Create Team Use Case

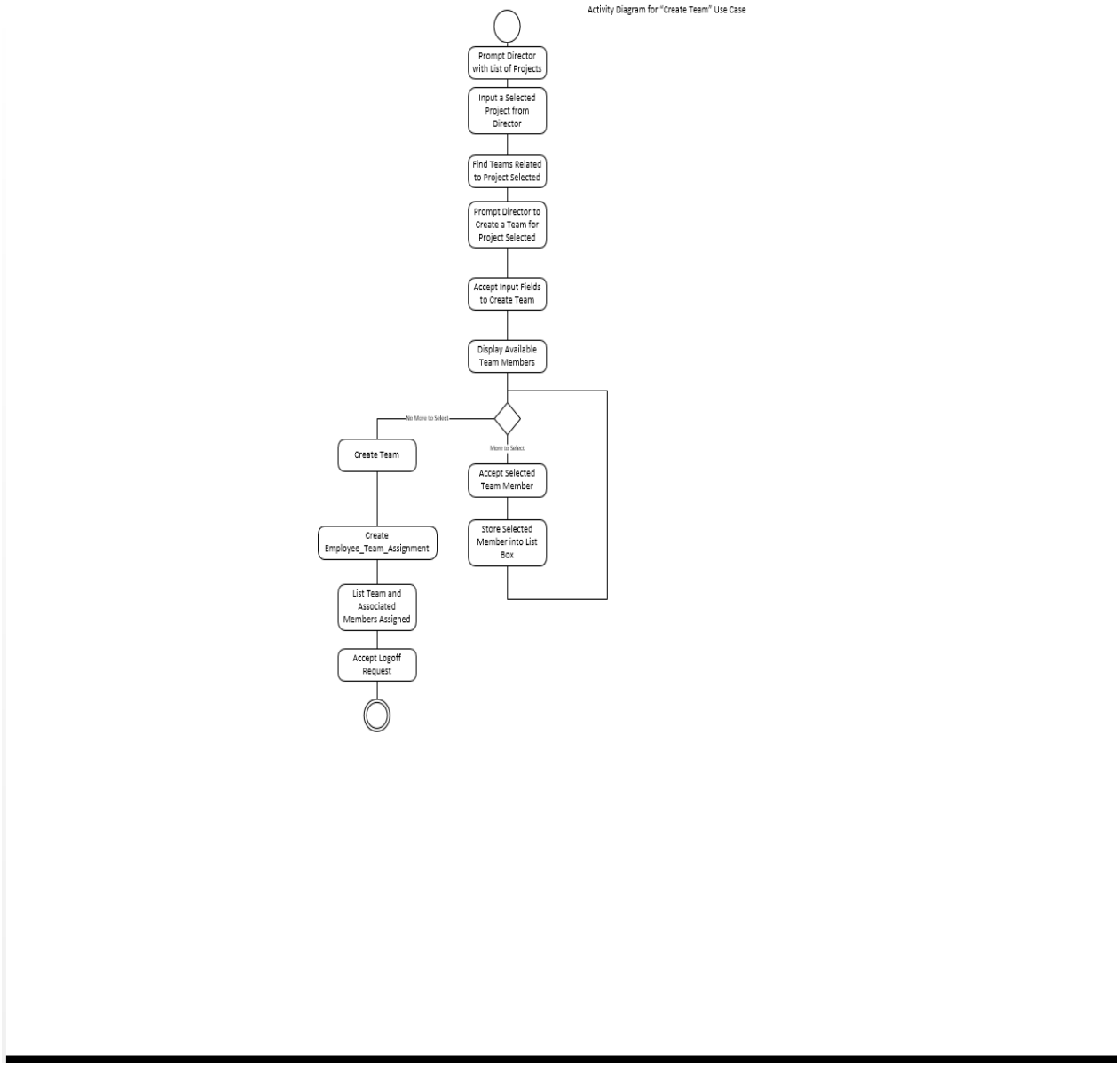

Figure 13: Activity Diagram for Assign Tasks to Team Members

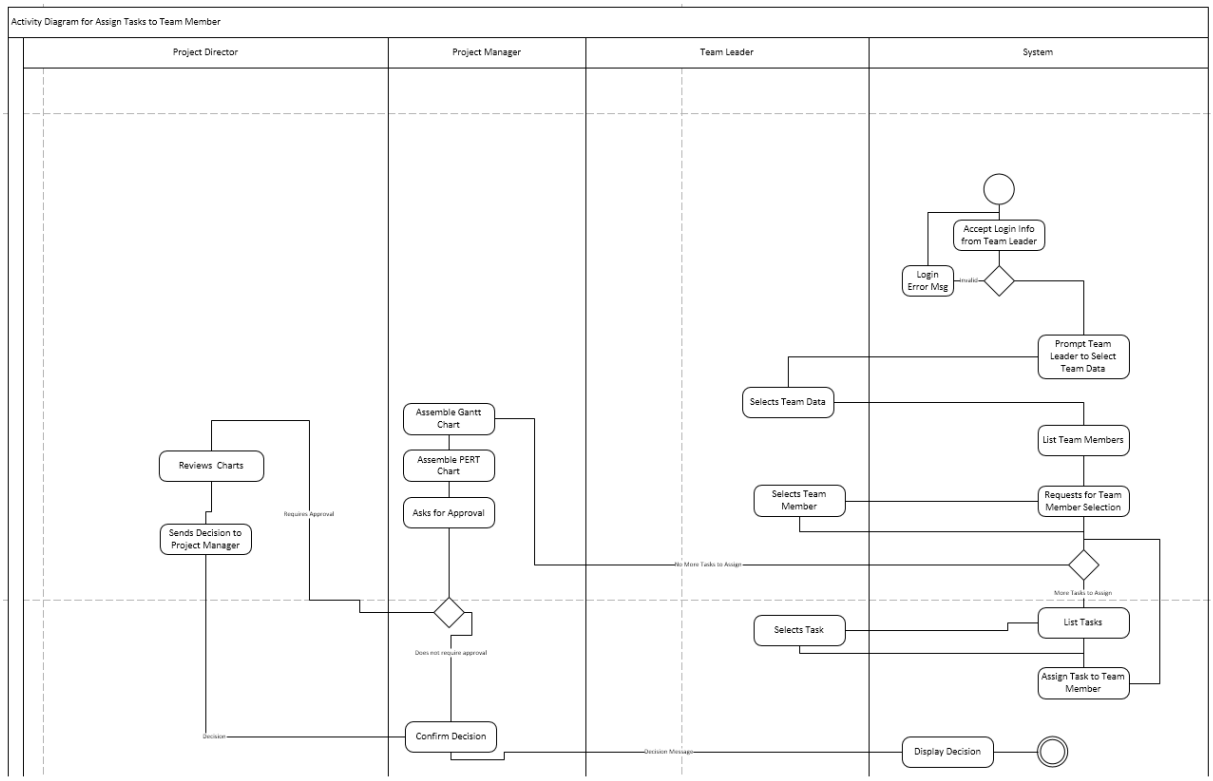

Figure 14: Sequence Diagram for Create Project Use Case

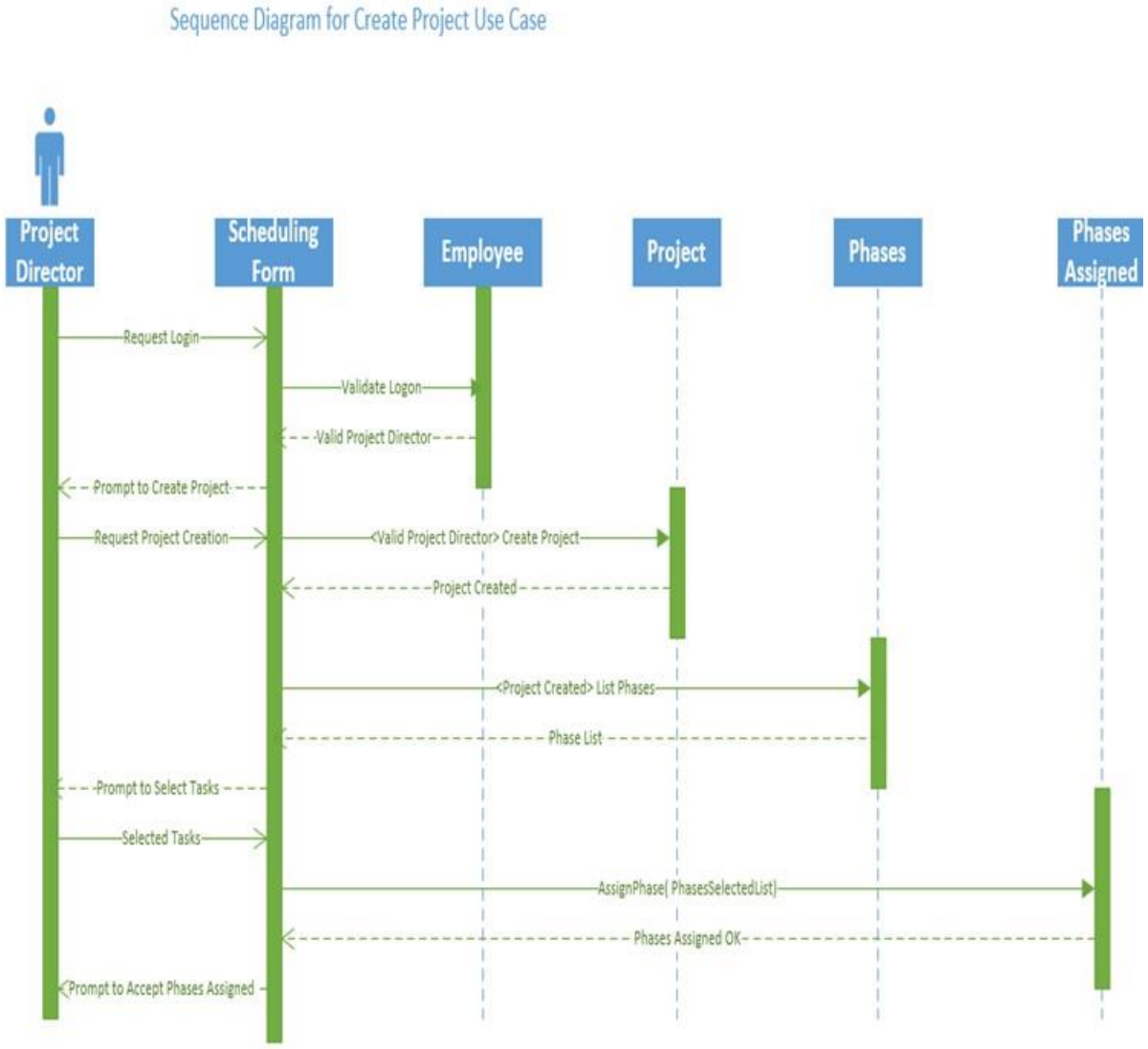

Figure 15: Capstone Class Semester Deliverables and Completion Time Line

Project Phase	Deliverable	Time Line
Planning	Project Plan, Gantt Chart and PERT Chart	Week 4
	Function Point Analysis Report	Week 5
	Cost-Benefit and Break-even Analysis Report	Week 6
Analysis	Functional Business Model (Use Case Diagram, Use Case Descriptions, and Activity Diagrams)	Week 7
	Structural Model (Class Diagram)	Week 8
	Systems Proposal Report and Presentation	Week 9
Design	Interface and Navigation Design	Week 10
	Behavioral Model (Sequence Diagrams and State Machine/Transition Diagrams)	Week 11
	Database Design and Program Design	Week 12
	Structured Walkthrough	Week 13
Implementation	Program Development	Week 14
	Program Testing	Week 15
Final	Systems Specification Report	Week 16
	Systems Specification Presentation by Teams	

A Model for Establishing a Cybersecurity Center of Excellence

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Abstract

In order to effectively ensure our continued technical advantage and future cybersecurity, we need a technologically skilled and cyber savvy workforce and an effective pipeline of future employees. Our Government has identified Cybersecurity as one of the most serious economic and national security challenges we face as a nation and has ear-marked cybersecurity education as a major part of its Comprehensive National Cybersecurity Initiative. By establishing a Cybersecurity Center of Excellence as part of our Computer Science - Cybersecurity curriculum, Saint Peter's University will be well positioned to train and educate students on this very important National initiative. In addition, we will be providing our students with the skill-sets necessary to become a member of the cybersecurity workforce that is expected to increase from global revenues of $95 billion in 2014 to $155 billion in 2019.

Keywords: Cybersecurity, Center of Excellence, Security, Information Technology

1. INTRODUCTION

The need for information security has been increasing in all industry sectors, including energy, healthcare, financial services, manufacturing, transportation, and homeland security. Associated with this need for information security, is the demand for professionals with knowledge in the areas of computer security and information risk and assurance.

In February 2012, the Commerce Department's National Institute of Standards and Technology (NIST) established a National Cybersecurity Center of Excellence. According to NIST, the Center is to operate as a public - private collaboration for accelerating the widespread adoption of integrated cybersecurity tools and technologies (National Institute of Standards and Technology, 2014). The National Cybersecurity Center of Excellence (NCCoE), located in Rockville, Maryland, provides businesses with real-world cybersecurity solutions, based on commercially available technologies. The center brings together experts from industry, government and academia to demonstrate integrated cybersecurity that is cost-effective, repeatable and scalable (National Cybersecurity Center of Excellence, 2014).

During the design of our Cybersecurity Center of Excellence Model, the NCCoE has been our advisor and has provided us with cybersecurity educational information. They have also introduced us to cybersecurity technology vendors and business partners. This advisor capacity role has played an important part in the design of our Cybersecurity Center of Excellence.

2. WHAT IS CYBERSECURITY?

Cybersecurity refers generally to the ability to control access to networked systems and the information they contain. Where cyber security controls are effective, cyberspace is considered a reliable, resilient, and trustworthy digital infrastructure. Where cyber security controls are

absent, incomplete, or poorly designed, cyberspace is considered the wild west of the digital age
(Bayuk, Healey, Rohmeyer, Sachs, Marcus, Schmidt, Weiss, 2013). Given the rapid global diffusion of Internet and social networking technologies, the degree to which societies around the world are increasingly linked is on the rise. With each new participant in the information age added to the network, the possibilities for threats and opportunities increase exponentially. Today, due to the Internet and the access it provides to file servers containing databases throughout the world, information has become available at virtually no cost to anyone who has a computer and Internet connectivity (Johnson, 2014).

3. CYBERCRIME COSTS & STATISTICS

According to an industry study by McAfee, cybercrimes cost the global economy up to US$500 billion annually. The study also found that cybercrimes can potentially result in the loss of 500,000 jobs in the United States (McAfee, 2013). Ponemon Institute's 2013 Cost of Cyber Crime study finds the average company in the U.S. experiences more than 100 successful cyber-attacks each year at a cost of $11.6M. That's an increase of 26% from 2012. The study also shows that companies who implement enabling security technologies reduced losses by nearly $4M, and those employing good security governance practices reduced costs by an average of $1.5M (Ponemon Institute, 2013). A study by Norton found that about 556 million adults are victims of cybercrime each year, which equates to 1.5 million victims per day and 18 victims per second (Norton, 2012). A good website that collects information on global cybersecurity attacks and reports statistics on the attacks is Hackmageddon.com. To illustrate, Figure 1 shows attacks based on country distribution, Figure 2 shows motivations behind attacks, and Figure 3 shows distribution of attack techniques. All illustrations are from the Hackmageddon.com (2013), web site and are for a snapshot in time, the month of August 2013. As illustrated in Figures 1-3, cyber-attacks are global. They are classified into 4 main areas of motivation: cybercrime, hacktivism, cyber warfare, and cyber espionage. Leading in the type of attack techniques that are known are DDoS with 17.8% and account hijacking with 16.8%. Out of all attack techniques, 24.3% are categorized an Unknown. Despite the estimated loss of money and information and known threats from adversaries, the precise impact of cybercrime is unknown because it is not always detected and reported.

Figure 1

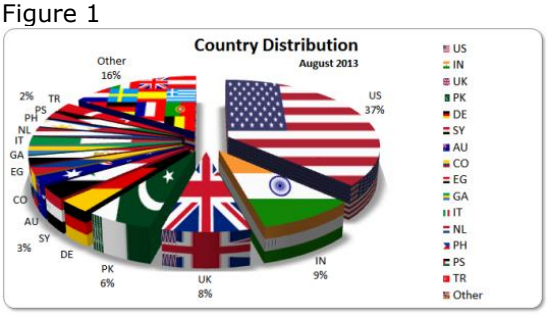


Figure 2

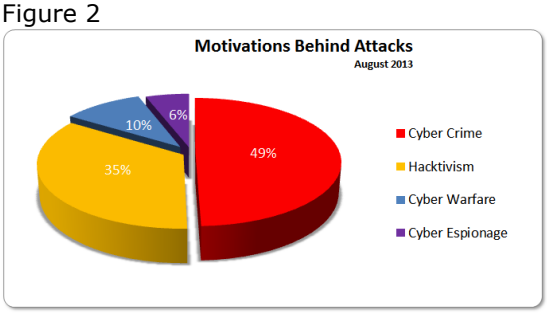
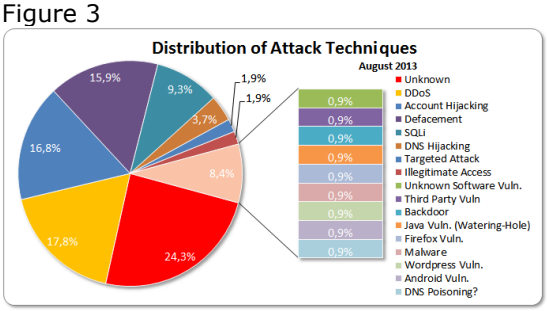


Figure 3



As a result of sophisticated technology and computers linked to information systems and databases, which are networked via lightning fast telecommunications links, we are in an era where the information revolution has changed the way organizations conduct business. Cyber-attacks continue to proliferate as vulnerabilities in computer systems and threats from hackers have increased every year. Malicious software threats, attacks, and botnets make front page news displaying the infamous success of hackers stealing data, crippling companies, and spying on corporations and governments.

Appropriate cybersecurity controls and tools need to be in place with a cybersecurity-savvy workforce that can combat the many risks and vulnerabilities faced in today's global society.

Our Government has identified Cybersecurity as one of the most serious economic and national security challenges we face as a nation. As a result, a Government project has been initiated to review the federal efforts to defend the United States information and communications infrastructure and the development of a comprehensive approach to secure America's digital infrastructure. One of the tenants of the comprehensive approach is to encourage institutions/organizations to provide education programs and training in Cybersecurity (The White House, 2014).

4. RESEARCH METHODOLOGY

During the 2013/2014 Academic Year, the Computer Science Department received approval to implement a new undergraduate concentration in Cybersecurity. Appendix A identifies the Cybersecurity curriculum concentration. We wanted to implement a Cybersecurity Center of Excellence as part of the curriculum to provide a value-added computing and learning environment for our students. Therefore, we conducted a study to determine what other United States colleges and universities were doing with Cybersecurity Labs in connection with their undergraduate and graduate Cybersecurity curriculums. The study would help us in designing the Model of our Cybersecurity COE. A total of 100 colleges and universities were studied. The schools that were part of the study were identified from literature searches on the Internet and from selecting schools around the country that have computer science degree offerings.

Table 1: Geographic Breakdown of Cybersecurity Degrees

North East	**17**
Mid Atlantic	**8**
South East	**1**
Mid West	**5**
South	**2**
South West	**0**
North West	**0**
West	**2**
Online	**3**
Total	**38**

Appendix B identifies schools studied that offer Cybersecurity undergraduate and graduate degrees including schools that have Cybersecurity Labs. From the 100 colleges and universities studied, thirty-eight schools offer Cybersecurity degrees and seventeen of those schools have Cybersecurity Labs.

Appendix C identifies schools studied that do not offer Cybersecurity degrees. There are sixty-two schools that do not offer Cybersecurity degrees. Twenty-four of the schools have Cybersecurity Labs.

Table 1 shows the geographic breakdown of schools offering Cybersecurity degrees.Of the 38 schools that offer Cybersecurity degrees:

- 27 have undergraduate programs
- 20 have graduate programs
- 9 have both undergraduate and graduate programs
- 3 are Online
- 17 have a Cybersecurity Lab

Adding the schools that have a Cybersecurity Lab from Appendix B and C, we come up with 41 schools that have a Cybersecurity Lab.

5. CYBERSECURITY CENTER OF EXCELLENCE MODEL

A detailed review of the 41 colleges and university Cybersecurity Labs led to the model that we developed for the Saint Peter's University Cybersecurity Center of Excellence. Implementation is planned for the start of the fall 2015 Term. Appendix D is an illustration of the Cybersecurity Center of Excellence (COE) Model. The Cybersecurity COE will consist of (1) a physical 24/7 state-of-the art computer network facility consisting of hardware platforms and operating systems, network, and security software/tools and (2) a 24/7 virtual web portal that consists of Cybersecurity documents, products, tools, and an eLearning repository that can be accessed anywhere around the world.

In reviewing the 41 colleges and universities that have Cybersecurity Labs, while they had good hardware and software infrastructures and ongoing research projects, none of them included other academic departments as part of their Cybersecurity Lab. To help differentiate the Saint Peter's University Cybersecurity COE from other colleges and universities Cybersecurity Labs, we are including in our Cybersecurity COE, two academic departments: (1) Criminal Justice, and (2) Business Administration. We are also including our Guarini Institute for Government and Leadership. The two departments and the Guarini Institute will be participants and have a role in the COE. They will include their students

in educational related activities/events and also emphasize cybersecurity technical, legal, and ethical issues during course lectures, assignments, and seminars.

Technology and equipment for the COE will be made possible from vendor donations, grants, and University funding. It will include large computer screens that provide real-time information on Cyber-attack timelines, world-wide geographic locations, cyber threats and vulnerabilities, metrics, and computer dashboards from SANS (SysAdmin, Audit, Network and Security, 2014), the CERTStation (CERTStation, 2014), and the Arbor Networks Attacks Source Map (Arbor Networks, 2014).

6. CYBERSECURITY COE CONTENTS

The Cybersecurity COE will consist of a network of Windows and Linux computers. The network is currently in the design stage and will include:

- Software:
  - Microsoft SQL Server R2
  - Microsoft .NET Framework 4.0
  - IBM Security AppScan: Security Vulnerability Program
  - HP WebInspect: Security Vulnerability Program
  - LogRhythm: Log Event and Management Analysis
  - CISCO Network Simulator
  - Department of Homeland Security Cyber Security Evaluation Tool
  - Network Sniffers and Intrusion Detection Software

- Virtual Machines:
  - NETinVM: VMWare Virtual Machine Image that contains a series of User-Mode Linux Virtual Machines
  - CISCO Virtual Lab

- Vendor Testing Sites:
  - IBM Altoromutual
  - HP Freebank
  - CrackMeBank

As illustrated in Appendix D, The Cybersecurity COE, consists of four domains:
Education, Leadership, Communication, and Innovation. The domains constitute the major tenants on which we designed our Cybersecurity COE. Following is what each domain will consist of/provide for:

Education:
- Programs
- Internships
- Workshops
- Tools
- Test Beds
- Physical Labs
- Virtual Labs
- Cyber Club
- Ethical Hacking Contest

Leadership:
- Subject Matter Experts
- Coordination of Resources
- Vendor Relations
- Business Relations
- Government Relations
- Liaison with other Universities

Communications:
- Increase University Awareness
- Increase Public Awareness
- Newsletters
- Multi-Media
- Threat/Vulnerability Dashboards

Innovation:
- Research
- Collaborations
- Case Studies
- Publications

In the Appendix D illustration at the top of the domains is also labeled: the National Cybersecurity Center of Excellence. We will continue to work with the NCCoE to get new ideas and incorporate state-of-the-art technology and software tools into our Cybersecurity COE. They are the overarching umbrella of our Cybersecurity COE that will help guide our future direction.

7. CYBERSECURITY COE OPERATIONS

The Cybersecurity COE, will operate in the Computer & Information Sciences Department of the University. It will be managed by a Director. The Director will be responsible for the day-to-day activities and growth of the COE. Student interns will provide technical support, work on projects, and conduct research in collaboration with University professors. We will create a Cybersecurity COE Board which will consist of Subject Matter Experts, by industry, from local businesses that will report to the Cybersecurity COE Director. This Board will meet to discuss the direction and technology/software to be deployed in the Cybersecurity COE and work to help promote the COE to the community and public. Our Cybersecurity COE will go live at the start of the fall 2015 Term.

8. RESEARCH AND WORKSHOP OPPORTUNITIES

Research will be conducted at the Cybersecurity COE that has a complex cybersecurity challenge that requires an integrated solution that has benefits for one or more industry sectors. Some examples of research could be in the area of cloud computing, mobile and wireless computing, and military information protection. The research conducted will lead to journal publications and conference presentations and papers. Workshops and seminars will be conducted by Computer Science Department subject matter experts. These workshops and seminars will be open to students, faculty and the public to educate the community, promote the Center and showcase the research activities that we are engaged in.

9. SUMMARY

Establishing a Cybersecurity COE at a college/university will provide an environment where students can learn, collaborate, conduct research, and have hands-on training to the latest technology providing a rich and dynamic learning experience. Students could participate in internships in the Cybersecurity field to allow them to further excel intellectually. By establishing a Cybersecurity COE, colleges/universities will be well positioned to train/educate their students on the very important National Cybersecurity initiative ear-marked by our Government on cyber-security education. In addition, students can be provided with the skill-sets necessary to become a member of the cybersecurity workforce that is estimated to grow from $95.60 billion in 2014 to $155.74 billion by 2019, at a Compound Annual Growth Rate of 10.3% from 2014 to 2019 (MarketsandMarkets, 2014).

During Academic Year 2014/2015, our University we will be putting in place the Cybersecurity COE. More details on our Cybersecurity Model including implementation progress and our collaboration efforts with the NCCoE will be discussed at the 2014 ISECON Conference.

10. REFERENCES

Arbor Networks. (2014). *Digital Attack Map - Global DDoS Attack Visualization.* Retrieved June 1, 2014, from: http://www.arbornetworks.com/

Bayuk, Jennifer, L., Healey, J., Rohmeyer, P., Sachs, Marcus, H., Schmidt, J., Weiss, J., (2012). *Cyber Security Policy Guidebook.* Hoboken, NJ: John Wiley & Sons, Inc.

CERTStation. (2014). C*ertStation's Cyber Security Dashboard.* Retrieved June 1, 2014, from:http://www.certstation.com/

Hackmageddon.com. (2013). *2013 Cyber Attacks Statistics.* Retrieved June 1, 2014, from: http://hackmageddon.com/2013-cyber-attacks-statistics/

Johnson, Thomas, A., (2012). *Power, National Security, and Transformational Global Events.* Boca Raton, FL: CRC Press.

MarketsandMarkets. (2014). Cyber Security Market worth $155.74 Billion by 2019. Retrieved June 1, 2014, from: http://www.marketsandmarkets.com/ PressReleases/cyber-security.asp

McAfee – Center for Strategic and International Studies. (2013). *The Economic Impact of CyberCrime and Cyber Espionage.* Retrieved June 1, 2014, from: http://www.mcafee.com/sg/resources/ reports/rp-economic-impact-cybercrime.pdf?cid=BHP016

National Cybersecurity Center of Excellence. (2014). *The Center.* Retrieved June 1, 2014, from: http://nccoe.nist.gov/?q=content/about

National Initiative for Cybersecurity Education. (2014). *National Cybersecurity Workforce Framework.* Retrieved June 1, 2014, from: http://csrc.nist.gov/nice/framework/

National Institute of Standards and Technology. (2014). *Cybersecurity Framework.* Retrieved June 1, 2014, from: http://www.nist.gov/cyberframework/ index.cfm

Norton. (2012). *Cybercrime Report 2012*. Retrieved June 1, 2014, from: http://nowstatic.norton.com/now/en/ pu/images/Promotions/2012/

cybercrimeReport/2012_Norton_Cybercrime_Report_Master_FINAL_050912.pdf

Ponemon Institute. (2013). *2013 Cost of Cyber Crime Study Reports.* Retrieved June 1, 2014, from: http://www.hpenterprisesecurity.com/ponemon-2013-cost-of-cyber-crime-study-reports

SysAdmin, Audit, Network and Security (SANS). (2014). *Programs.* Retrieved June 1, 2014, from: http://www.sans.org/programs/

The White House. (2014). *Comprehensive National Cybersecurity Initiative.* Retrieved June 1, 2014, from: http://www.whitehouse.gov/issues/foreign-policy/cybersecurity/national-initiative

Editor's Note:

This paper was selected for inclusion in the journal as an ISECON 2014 Meritorious Paper. The acceptance rate is typically 15% for this category of paper based on blind reviews from six or more peers including three or more former best papers authors who did not submit a paper in 2014.

APPENDIX A

Requirements for Computer Science Major - Cybersecurity Concentration.

This option is designed for those who want to learn the technology that is necessary to secure and defend information systems and networks. Students will be able to:

- Protect an organization's vital information and assets
- Implement cybersecurity best practices and risk management
- Understand how to use software to minimize vulnerabilities
- Implement network monitoring and real-time security solutions
- Analyze persistent threats and implement counter measures
- Conduct risk assessments on information systems and networks
- Examine cybercrimes and support recovery of operations
- Create and communicate cybersecurity strategies
- Manage cybersecurity projects

COURSE	CREDITS
Elementary Calculus I	3
Elementary Calculus II	3
Fund Comp Prog: Html, JavaScript, C++	3
Introduction to C++	3
Advanced Programing Techniques Using C++	3
Information Technology Ethics	3
Data Structures	3
Computer Mathematics	3
Quantitative Methods for Business	3
Database Concepts	3
Information Technology Audit	3
Disaster Recovery	3
Cybersecurity and Risk Management	3
Telecommunications Networks	3
Cryptography	3
Cybersecurity Lab	3
Computer Science Major Capstone Course	3
	Total Credits 51

APPENDIX B

Colleges and Universities Offering Cybersecurity Degrees with associated Labs.

College/University	Undergrad	Graduate	Cyber Security Lab
Air Force Academy	**Y**		**Y**
Champlain University	**Y**		
Columbia		**Y**	**Y**
DePaul University	**Y**		
FDU	**Y**		
George Mason University	**Y**	**Y**	**Y**
George Washington University		**Y**	
Georgia Tech		**Y**	**Y**
Mercy College	**Y**	**Y**	
New England Institute of Technology	**Y**		
NJIT		**Y**	**Y**
NYU-Poly		**Y**	**Y**
Penn State (ONLINE)	**Y**		**Y**
Purdue	**Y**	**Y**	**Y**
Rasmussen College	**Y**		
RIT	**Y**	**Y**	**Y**
Robert Morris University	**Y**		
Sacred Heart University		**Y**	
Saint Peter's University	**Y**		
South East Missouri State University	**Y**		
Southern Methodist University	**Y**		**Y**
St. Johns University	**Y**	**Y**	
Stevens Institute of Technology	**Y**	**Y**	**Y**
Temple		**Y**	
University of Massachusetts Amherst	**Y**		**Y**
University of Dallas		**Y**	
University of Maryland	**Y**	**Y**	**Y**
University of Maryland Baltimore County		**Y**	**Y**
University of Maryland University College (ONLINE)	**Y**	**Y**	
University of Phoenix (ONLINE)	**Y**		
University of Notre Dame	**Y**		
University of Pittsburgh	**Y**		

US Military Academy	**Y**		**Y**
US Naval Academy	**Y**		**Y**
USC	**Y**	**Y**	**Y**
Villanova		**Y**	
Virginia College		**Y**	
West Chester University	**Y**		
TOTALS	**27**	**20**	**17**

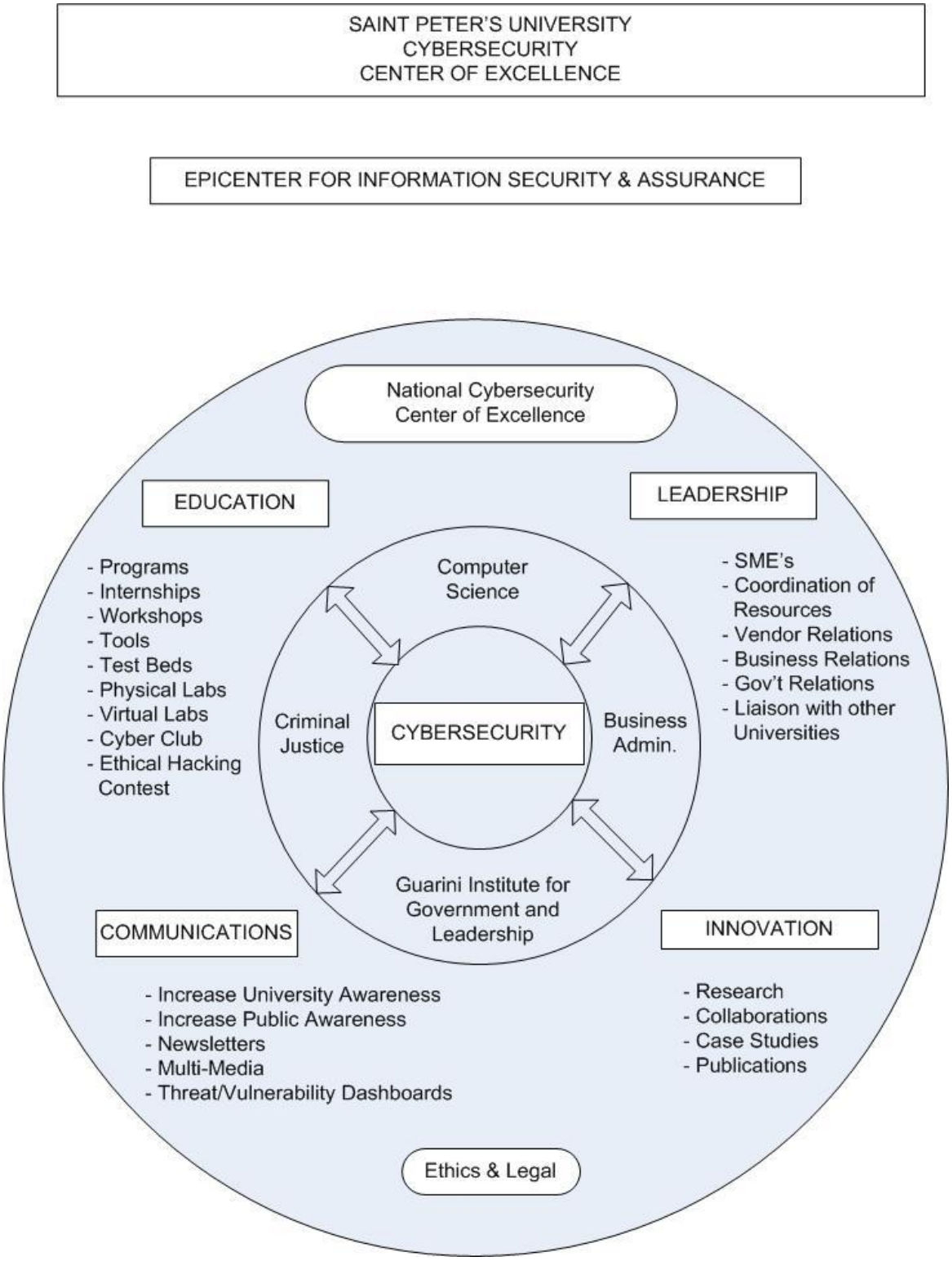
APPENDIX C

College/University No Cybersecurity Degree – Has Cybersecurity Lab	College/University No Cybersecurity Degree – No Cybersecurity Lab
Boston University	Alabama
Carnegie Mellon	Auburn
Clemson	Boston College
Duke	Brigham Young
Indiana University	Brown University
Iowa State University	Case Western Reserve
James Madison University	Fairfield
Kansas State	Florida International
LSU	Georgetown
Mississippi State	Gonzaga University
MIT	Harvard
North Carolina State	Manhattan College
Oklahoma State	Memphis University
Oregon	Michigan
Pace University	Michigan State
Penn State	Northwestern University
Santa Clara University	Ohio State
Stanford	Princeton
Stony Brook	Rutgers
UCLA	Saint Louis University
University of California - Berkley	Seton Hall
University of Texas	Syracuse
University of Washington	University of Chicago
Virginia Tech	University of Cincinnati
	University of Florida
	University of Georgia
	University of Illinois
	University of Miami
	University of North Carolina
	University of Pennsylvania
	University of San Diego
	University of South Florida
	University of Wisconsin
	Virginia

	Wake Forest William & Mary Xavier Yale

APPENDIX D

Cybersecurity Center of Excellence – Model



Course Redesign Based On the Quality Matters Program: Examples of Before and After

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Abstract

Most universities continue to expand their online course offerings because there is strong demand for such educational opportunities. However, the quality of instruction for online courses continues to be a concern. The Quality Matters (QM) Program provides a set of research-based standards that can guide the redesign of a course and can be used as a rubric to evaluate a course. This paper shows the transition of one course as it was redesigned based on the QM standards. Specific examples of "before" and "after content are shown along with discussion of the changes made and some design issues encountered. Feedback from students midway through the first semester using the redesigned course is presented.

Keywords: Quality Matters Rubric, Online Classes, Blended Classes, Course Design, Information Systems Education.

1. INTRODUCTION

The National Center for Education Statistics (2012) released data showing that 25.8% of students at post-secondary institutions are enrolled in some online courses. However, there is ongoing concern about the quality of online courses even as colleges offer more online programs. Dayton and McShane (2007) and others suggest, though, that high quality courses, whether face-to-face or online, share the same quality elements (Benton & White, 2010).

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

overview and introduction (1), learning objectives (2), assessment and measurement (3), instructional materials (4), learner interaction and engagement (5), course technology (6), learner support (7), and accessibility (8) (MarylandOnline Inc., 2011). (A revised set of the standards was released in August 2014.) The rubric has three categories of standards: Essential (3 points), Very Important (2 points) or Important (1 point) (Finley, 2012; Benton & White, 2010).

A faculty member at a university in the Southwest wanted to redesign a course that had been taught once already as an online course and is expected to be an online offering one semester during each academic year. The instructor was dissatisfied with the organizational structure of the course and felt it was not easy for students to navigate and locate specific items.

Prior to redesigning the course this teacher attended a two-day QM Regional Conference. Shortly after that the instructor attended a 20-hour Course Development Camp based on the QM Program, and taught by the university's Instructional Innovation and Quality (IIQ) unit. This camp provided considerable support to the instructor and other workshop participants while they worked through the course design process. It may seem obvious but it is worth noting that most educational institutions have support services for faculty and their online course design efforts (Finley, 2012; Dayton et al., 2007). The instructor in this paper found the support provided essential to her redesign work.

This paper presents some "before" and "after" material from the redesigned course and primarily discusses four of the eight QM standards: course overview and introduction, learning objectives, learner support and accessibility.

2. THE COURSE TO REDESIGN

The course is part of an Information Systems (IS) degree in the College of Business and it is required for students majoring in IS. This course is also required by at least one other degree program in another college. The course title is "Systems Analysis and Design" and it is scheduled as an online course in the fall semester and face-to-face in the spring semester.

This junior-level course covers the systems development life cycle for designing and building databases and applications. It includes coverage of techniques for project planning, information gathering, modeling and building prototypes. Over the past few years the instructor had organized the course into learning modules that are independent of any particular textbook. There is considerable use of handouts written by the instructor and Web resources that are cited in the handouts. There are numerous videos, most of which are done by the instructor but some are from other sources.

The learning management system (LMS) currently used by the university is Canvas from Instructure (http://www.instructure.com/). Prior to this course redesign the LMS was used extensively by the instructor throughout the face-to-face course to deliver course content, provide online quizzes, and receive submissions from students for assignments. Therefore, the course that was redesigned was not making a major leap from a traditional classroom instruction format but, rather, it was a course already supported extensively by educational technology. Still, there were significant changes made and the remainder of this paper contrasts some "before" and "after" examples.

3. A COURSE MAP

When the instructor attended the Course Development Camp the first activity was developing a course map, which is a best practice in course instructional design (Boettcher & Conrad, 2010; Elbaum, McIntyre, & Smith, 2002; OGrady-Marshall, 2013; Smith, 2008). Mapping the course involves planning the course components as defined by Quality Matters core standards 2 through 6 - defining measurable course and unit learning objectives and aligning the assessments, activities, interactions, and materials to support learners in meeting the learning objectives (MarylandOnline, Inc, 2011). Creating a course map helped the faculty member "see" the course as a whole and ensure greater consistency across the learning modules. Learning objectives within a module are mapped to the overall course objectives to ensure alignment of course components with overall objectives. A well-organized, easily navigable course, with all the components aligned and supporting the learning objectives increases learner self-efficacy, satisfaction, retention, and achievement (Elbaum, et al., 2002; Palloff & Pratt, 2005; Smith, 2008). The module learning objectives and how they are aligned with course objectives, per the course map, were integrated into the course and shared with students from the very beginning of the course.

Appendix A shows the complete matrix of course and module learning objects and a snapshot is shown here in Figure 1.

Module Learning Objectives *		Course Learning Objectives					
		C1. Describe the foundations of systems development, the life cycle and some methodologies for working through the life cycle.	C2. Apply project management steps and techniques for the planning phase of the systems development life cycle.	C3. Apply ways to gather information about requirements using traditional methods and prototyping.	C4. Depict system and user requirements using data and process modeling techniques.	C5. Apply relational database terminology and design concepts.	C6. Create a prototype information system using an SDLC methodology and CASE tool.
M1.1	Describe the evolution of the SDLC.	✔					
M1.2	List the phases of the SDLC.	✔					
M1.3	Summarize the SDLC activities.	✔	✔	✔	✔		
M1.4	Describe different SDLC methodologies.	✔	✔	✔			✔

Figure 1 Course Map (partial view)

4. COURSE OVERVIEW & INTRODUCTION

Homepage

The Course Overview and Introduction standard addresses whether the course structure is made clear to students right away. Are instructions clear about how to start and where to find course components? Is sufficient information about the course provided to the student through the syllabus and other documents? Does the instructor introduce himself/herself and do students introduce themselves? Figures 2 and 3 show the original course homepage, first without comments and then with comments to highlight certain items. Figures 4 and 5 show the redesigned homepage. (Appendix B has many of the screen shots in a larger format.)

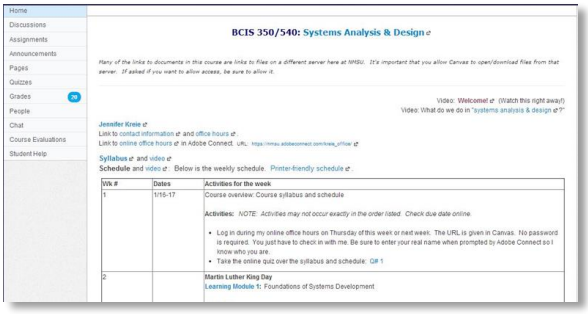


Figure 2 Original or Before QM

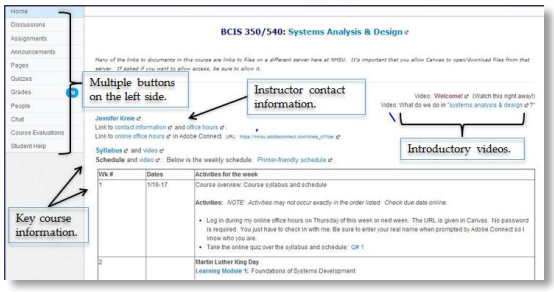


Figure 3 Original or Before QM

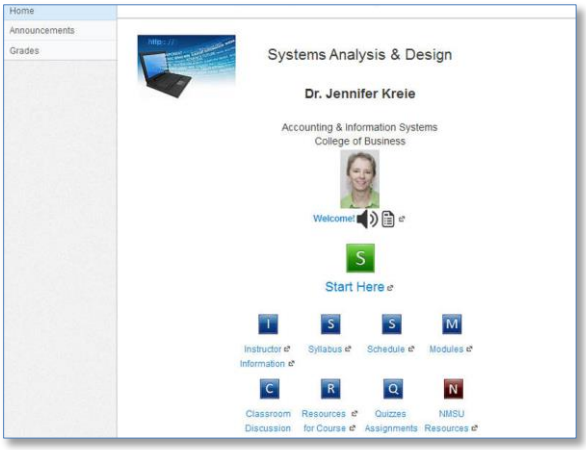


Figure 4 Redesigned or After QM

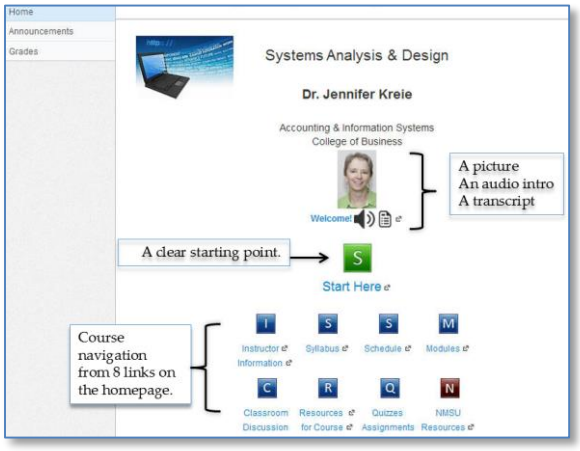


Figure 5 Redesigned or After QM

The original page is obviously more text-based and the new page more graphical but this was a design preference of the instructor, not something prescribed by QM. Many QM recognized courses have more text on the course homepage than this example has. In fact, it is important to point out that no design template is presented by QM as the ideal or one and only way. The QM standards guide course design but there are myriad ways the standards can be met.

The instructor believed all the key information about the course was available on the original homepage but was not confident that students looked at it all. The redesigned homepage has a clearly identified starting point for students, which addresses QM Standard 1.1. The transcript for the course recorded welcome addresses another standard: accessibility (QM Standard 8.2). Plus, the audio message in combination with the instructor picture establishes a welcoming instructor presence (Boettcher & Conrad, 2010). Instructor presence is very important, because active instructor participation in the course impacts students' persistence, performance, and satisfaction in online courses (Boettcher & Conrad, 2010; Palloff & Pratt, 2005; Picciano, 2002).

Start Here

The "Start Here" button on the homepage opens an entirely new page in the course. Figure 6 shows a portion of this page. The "Getting Started" page tells the student about several things:

- the relationship between each module's learning objectives and the overall course objectives,
- the navigation guide for the course (a video and transcript),
- the importance of immediately reading the syllabus and schedule, and
- the community of students in the course via self-introduction in an assigned discussion.

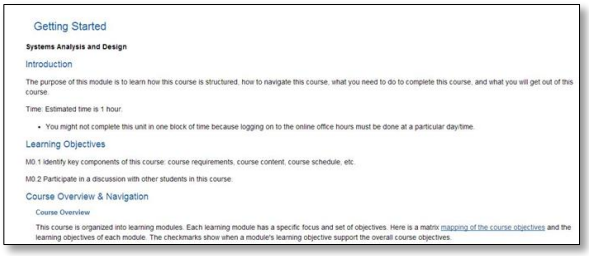


Figure 6 Getting Started

Learning Objectives Mapping

The course map shown in Figure 1 is given to students in the "Start Here" page. This summary of course and module learning objectives helps students understand what they will learn and how each learning module relates to the course's overall objectives.

The "Getting Started" page tells the student to read the syllabus and schedule and an assessment of this required activity is done via a scored quiz. The syllabus, which has a hyperlink on the "Getting Started" and course homepage, is lengthy. In the past it has been three to four pages but it is even longer in the redesigned version (approximately 8 pages). Some new sections were added and some existing sections were expanded. Figure 7 shows a partial view of the redesigned syllabus.

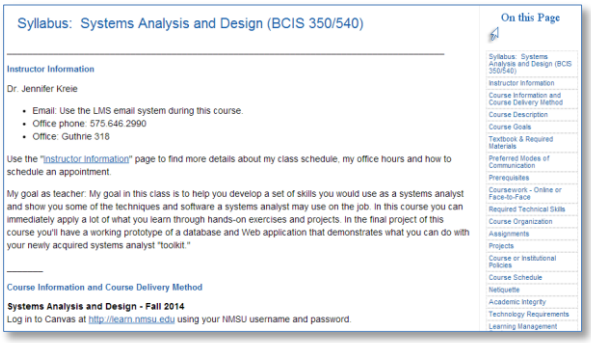


Figure 7 Syllabus

Figure 8 shows an activity on the "Getting Started" page that supports the QM standard of learner interaction and engagement. Students are told to introduce themselves to others in the class and there is a link to the discussion topic for this activity.

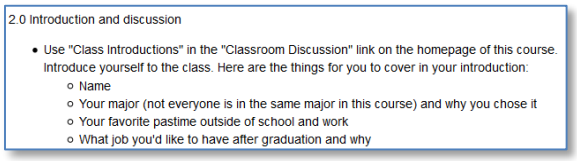


Figure 8 Introduction activity

Software Tool

As a technical side note about the redesign, the instructor decided to use SoftChalk Create (2014) to create most of the web pages with course content. SoftChalk Create is authoring software for creating learning content and Figure 7 above shows the standard browser display based on a template chosen by the instructor. There is a right-side navigation pane that presents quick links to sections of the page (HTML anchors based on text tagged as a heading) so that a lengthy page, such as the syllabus, is easier to navigate. Also, there is a "print all" option that omits the navigation pane when the page is printed.

After working with SoftChalk the instructor decided to flatten the hierarchy of web pages used to deliver course content. For example, the Planning module in the original course design had a top-level page that branched to two sub-content pages. In the redesign there is

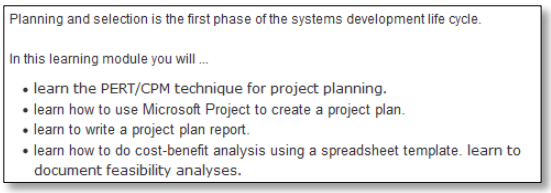
one, longer page and the navigation panel on the right side highlights the subsections of the page.

Except for a few completely new pages added during the redesign, the course content pages were not built from scratch. Content from pages in the previous version of the course were moved to the SoftChalk template using copy/paste then editing was done, as needed, to follow the QM standards.

5. LEARNING OBJECTIVES

For the instructor the QM guidelines for learning objectives was challenging because the QM Program stipulates that objectives must be measurable. In the original course the instructor already had course objectives listed in the syllabus and objectives for each module in the course but they did not meet the QM Program's learning objectives standard of measurability. All of the objectives from the original course were revised to use more appropriate wording. For example, a previous course objective said "The student will know traditional analysis and design techniques for data and process modeling." This was changed to "Depict system and user requirements using data and process modeling techniques. In general, words such as "know" and "learn" are replaced with action verbs such as "describe" and "depict." The instructor often referred to a verb wheel based on Bloom's taxonomy of learning (http://en.wikipedia.org/wiki/Bloom%27s_taxonomy).

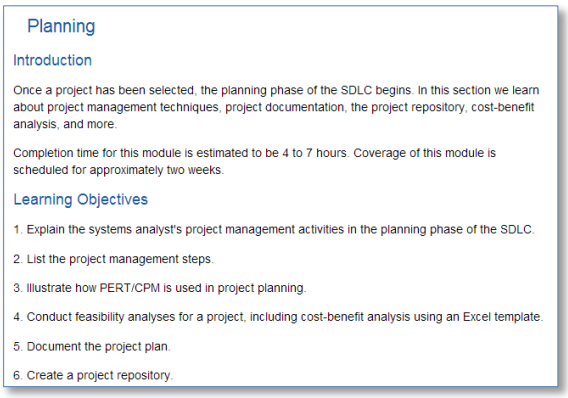
Figure 9 shows the original Planning module with its list of "what you will learn" contrasted with the redesigned page in Figure 10.


Planning and selection is the first phase of the systems development life cycle.

In this learning module you will ...

- learn the PERT/CPM technique for project planning.
- learn how to use Microsoft Project to create a project plan.
- learn to write a project plan report.
- learn how to do cost-benefit analysis using a spreadsheet template. learn to document feasibility analyses.

Figure 9 Previous objectives


Planning

Introduction

Once a project has been selected, the planning phase of the SDLC begins. In this section we learn about project management techniques, project documentation, the project repository, cost-benefit analysis, and more.

Completion time for this module is estimated to be 4 to 7 hours. Coverage of this module is scheduled for approximately two weeks.

Learning Objectives

1. Explain the systems analyst's project management activities in the planning phase of the SDLC.
2. List the project management steps.
3. Illustrate how PERT/CPM is used in project planning.
4. Conduct feasibility analyses for a project, including cost-benefit analysis using an Excel template.
5. Document the project plan.
6. Create a project repository.

Figure 10 Revised objectives

As mentioned earlier in the section about the course map, it is a key principle of QM to align learning objectives within a course component/module to the overall course objectives (Quality Matters Program, 2013). Thus in each module there should be materials (textbook readings, handouts, videos, activities, technology, and assessments) that teach to these objectives and assignments and activities for the student to demonstrate that each learning objective is met. For example, an activity for objectives 1 and 2 shown in Figure 10 might be a matching question in a quiz that lists project management steps and their definitions and/or there might be some fill-in-the-blank questions for definitions. Objective 3 could have corresponding activities in which the student completes a set of PERT/CPM problems. The other objectives would have similar activities and assignments.

6. LEARNER SUPPORT

The Learner Support QM standard had been partially addressed in the original course through the syllabus. The redesigned syllabus has more content about learner support and a university resource page was added that has a compendium of resources available to students through the university. This university resource page has sections for technical support, academic support, student services and career services. Within each section there is information and links to appropriate university Web pages. Figure 11 shows a portion of the resource page.

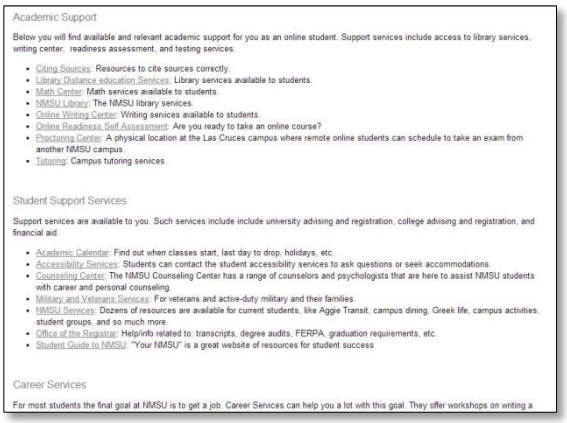


Figure 11 Resources for student

As a technical side note, the list of resources is pertinent to any course so the instructor has each course's homepage link to the same university resources page. This avoids duplicating information in each class and having multiple pages to update when information changes. The same one-central-page design was used for the instructor information, including contact information, office hours, etc. The instructor's personal introduction (video and transcript) is generic and gives general information about the instructor's education and professional experience but does not talk about a particular course. Each course homepage has a short "welcome" recording from the instructor about that particular course.

7. ACCESSIBILITY

Both the Canvas LMS and SoftChalk provide many accessibility features but the instructor still had to make some changes to improve accessibility. The first example is on the course's new homepage. There is text that says "welcome" next to a speaker icon. Both the text and speaker are hyperlinks to a short recorded welcome to the course. The original course had something similar but the new design make the welcome message more visible and pays more attention to accessibility by also providing a text file of the recording content.

Another example of improved accessibility is the introduction to course navigation, as shown in Figure 12. This is found on the "Getting Started" page. There is a video and a transcript of the video that describe how to navigate to the major course components.

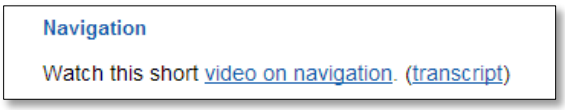


Figure 12 Navigation guidance

8. STUDENT FEEDBACK

A survey was given to students in the 7th week of the semester when the redesigned course was first used. There were 28 students registered at the beginning of the semester. four withdrew quite early in the semester and this is not typical for this course in semesters prior to it being offered online. In the two semesters teaching this course online the instructor saw a higher rate of dropouts and earlier in the online course offering than occurred in past years for the face-to-face class. Twenty-seven students enrolled in the redesigned, online course. Four students withdrew fairly quickly and two stopped participating in the course but never officially withdrew. Twenty-two students took the survey. Responses were anonymous but students were given a small extra credit incentive to complete the survey.

First, survey respondents were asked a couple of background questions. Ninety-one percent of the students have taken at least one other online course prior to this one and 73% have taken four or more courses online. Thirty-two percent said they took this online offering for the convenience.

Table 1 summarizes the responses of students about the course.

9. CONCLUSIONS

The course redesign based on the QM Program standards resulted in several significant changes to the presentation of the course. Although it was time consuming and challenging, creating a course map was a very important first step in redesigning the course for improved quality. The instructor spent considerable time within a module making sure readings, assignments and other activities were clearly aligned with at least one module learning objective. Though the majority of the subject matter did not change, there were some modifications made in how the material is presented and the activities that students complete.

The course overview and introduction given to students was the most visible and time-consuming part of the redesign and this is

something other faculty have also experienced (Finley, 2012; Benton & White, 2010). New pages were added and the presentation of information was significantly modified. Initially, the instructor expected to the complete the entire course redesign in two weeks but that amount of time was spent on the mapping of course objectives and the introduction material for students.

Another change was to promote more student-to-student interaction. Student-to-student interaction is one of the seven principles of good undergraduate teaching (Loafman & Altman, 2014; Puzziferro & Shelton, 2008; Dayton et al. 2007) and research has shown it has a positive correlation with student learning (Duncan, Kenworthy & McNamara, 2012). This course needed more interaction activities between students and this was done through graded discussions. For example, within the first week of the course students had to introduce themselves in a discussion posting (guidelines were provided) and they had to respond in a meaningful way to at least one other student's introduction.

During the redesign process the instructor made use of a valuable resource provided by the university—the Instructional Innovation and Quality (IIQ) staff. IIQ offers help to faculty in many ways: workshops, templates, examples of QM recognized courses and individual assistance. Many universities offer similar resources to faculty that want to transition a course from face-to-face to online or improve an existing online course.

The instructor does not plan to change the course in any significant way when it is taught in a traditional classroom setting. As Duncan et al. noted (2007), the design process may not be truly different for either format. Principles for good undergraduate teaching apply in either delivery mode. The instructor believes the new course design will support the "flipped class" approach for the classroom-based setting in which students study course content outside of class and attend class for more active learning, guidance and interaction rather than lecture.

This new design will be used in the coming fall semester. Input from students will be solicited during and at the end of the course. After one semester of use and, probably, modifications, the instructor plans to submit the course for QM review and possible QM recognition.

10. REFERENCES

Benton, R. F. and White, L. F. (2010) Quality Measures that Matter, Issues in Informing Science and Information Technology, 7, 61-72. (Journal with 2 Authors)

Boettcher, J.V., & Conrad, R. (2010).The online teaching survival guide: Simple and practical pedagogical tips. San Francisco, CA: Jossey-Bass. (Book)

Dayton, D. and McShane, M. (2007) Developing a Quality Assurance Process to Guide the Design and Assessment of Online Courses, Technical Communication, 54(4), 475-485. (Journal with 2 Authors)

Duncan, K., Kenworthy, A. and McNamara, R. (2012) The Effect of Synchronous and Asynchronous Participation on Students' Performance in Online Accounting Courses, Accounting Education: An International Journal, 21(4), 431-449. (Online Journal 3 or more Authors)

Elbaum, B., McIntyre, C. & Smith, A. (2002). Essential elements: prepare. design, and teach your course online. Madison, WI: Atwood Publishing. (Book)

Finley, D. L. (2012) Using Quality Matters (QM) to Improve All Courses, Journal of Teaching and Learning with Technology, 1(2), 48-50. (Journal with 1 Author)

Loafman, L. and Altman, B. W. (2014) Going Online: Building Your Business Law Course Using the Quality Matters Rubric. Journal of Legal Studies Education, 31(1), 21-54. (Journal with 2 Authors)

MarylandOnline. Inc. (2011). Quality matters rubric standards 2011-2013 edition with assigned point values. Retrieved from https://www.qualitymatters.org/rubric (Online Article)

National Center for Education Statistics (2012), Enrollment in Distance Education Courses, by State: Fall 2012, Retrieved June 24, from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014023 (Online Article)

OGrady-Marshall, R. (2013). How to put a course online-second baby steps-course map. Retrieved from http://bit.ly/139c1aF (Online Article)

Palloff, R., and Pratt, K. (2005). Collaborating online: Learning together in community. San Francisco, CA: Jossey-Bass. (Book)

Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. Journal of Asynchronous Learning Networks, 6(1), 21-38 (Journal with 2 Authors)

Puzziferro, M. and Shelton, K. (2008) A Model for Developing High-Quality Online Courses: Integrating a Systems Approach with Learning Theory, Journal of Asynchronous Learning Networks, 12(3-4) 119-135 (Journal 2 Authors)

Quality Matters Program. (2013) Quality Matters! Using the Quality Matters Rubric to Develop Online Courses. Retrieved June 27, 2013 from http://www.qualitymatters.org (Online Article)

Shattuck, K. (2007) Quality Matters: Collaborative Program Planning at a State Level, Online Journal of Distance Learning Administration, X(III). (Online Journal with 1 Author)

Smith, R. (2008). Conquering the content: A step-by-step guide to web-based course development. San Francisco, CA: Jossey-Bass

SoftChalk (2014), Retrieved on June 24, 2014, http://softchalk.com/ (Online Article)

Westerfelt, D. (2011) Quality Does Matter in Your University Online Course, Business Education Innovation Journal, 3(2), 5-12 (Journal with 1 Author)

Wikipedia, Bloom's taxonomy, Retrieved on September 24, 2014, http://en.wikipedia.org/wiki/Bloom%27s_taxonomy (Online Article)

APPENDIX A

Learning Objectives Matrix

A Matrix of Course and Module Learning Objectives

Module Learning Objectives *		**Course Learning Objectives**					
		C1. Describe the foundations of systems development, the life cycle and some methodologies for working through the life cycle.	C2. Apply project management steps and techniques for the planning phase of the systems development life cycle.	C3. Apply ways to gather information about requirements using traditional methods and prototyping.	C4. Depict system and user requirements using data and process modeling techniques.	C5. Apply relational database terminology and design concepts.	C6. Create a prototype information system using an SDLC methodology and CASE tool.
M1.1	Describe the evolution of the SDLC.	✔					
M1.2	List the phases of the SDLC.	✔					
M1.3	Summarize the SDLC activities.	✔	✔	✔	✔		
M1.4	Describe different SDLC methodologies.	✔	✔	✔			✔
M2.1	Explain the systems analyst role in the planning phase.		✔				
M2.2	List the project management steps.		✔				
M2.3	Illustrate PERT/CPM's used in project planning.	✔	✔				

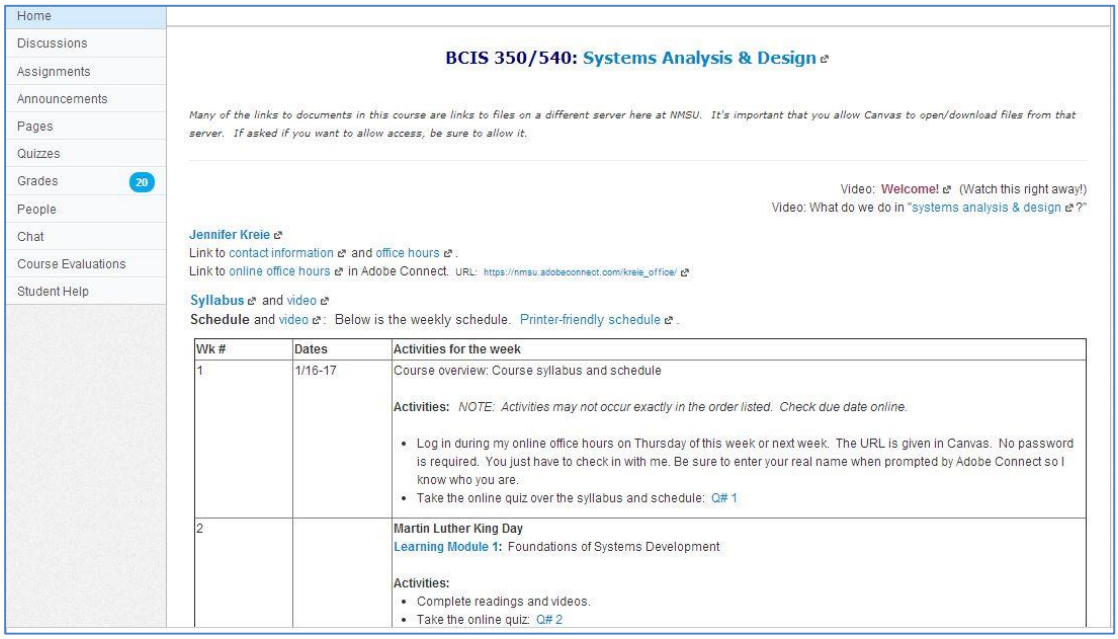
M2.4	Conduct feasibility analyses for a project.		✔				
M2.5	Create project planning documents.	✔	✔				
M2.6	Create a project repository.		✔				
M3.1	Apply different information gathering methods.			✔			
M3.2	Describe guidelines for conducting a meeting.			✔			
M3.3	Construct process models.				✔		
M3.4	Construct a data model.				✔	✔	
M4.1	Implement data and process models.					✔	✔
M4.2	Use a CASE tool to build a database and Web application.				✔	✔	✔
M4.3	Interpret existing project documentation.				✔	✔	✔
M5.1	Create a working prototype.					✔	✔
M5.2	Post a project		✔				✔

	web site.						
M5.3	Plan a project.	✔	✔				✔
M6.1	Gather information.			✔			✔
M6.2	Create models.				✔	✔	✔
M6.3	Design and build Web application prototype.					✔	✔

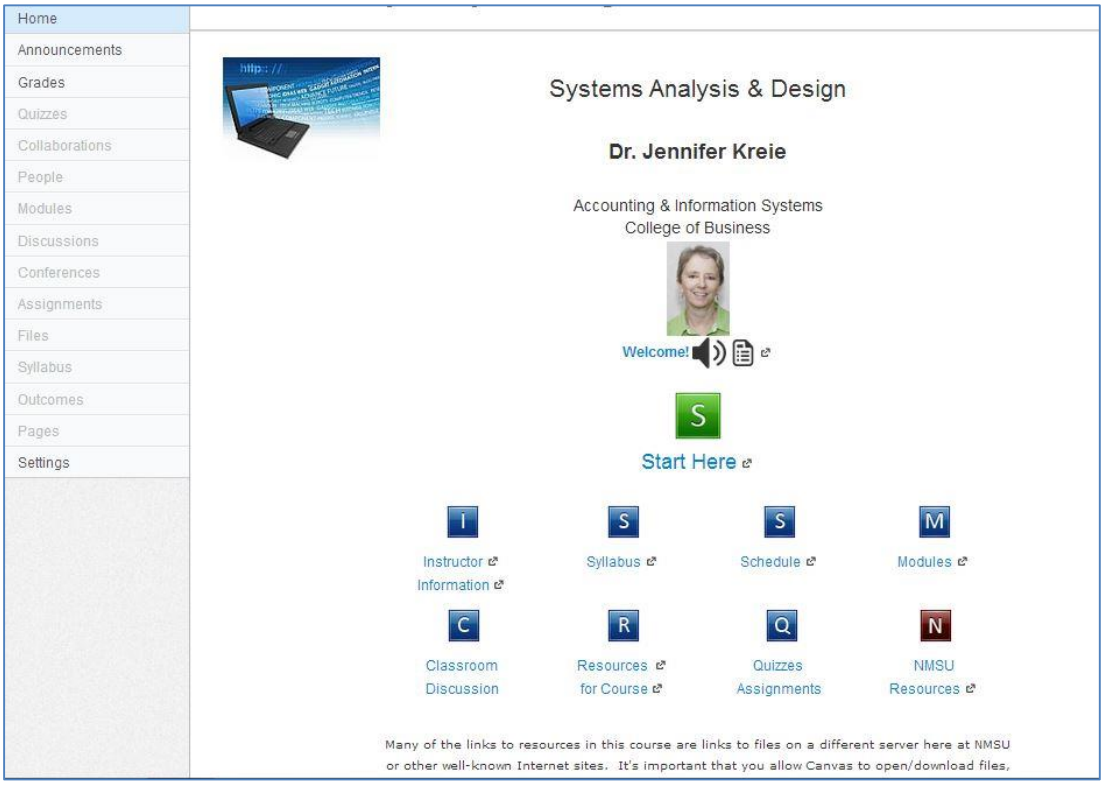
APPENDIX B

Course Homepage Comparison (Figures 2-5)

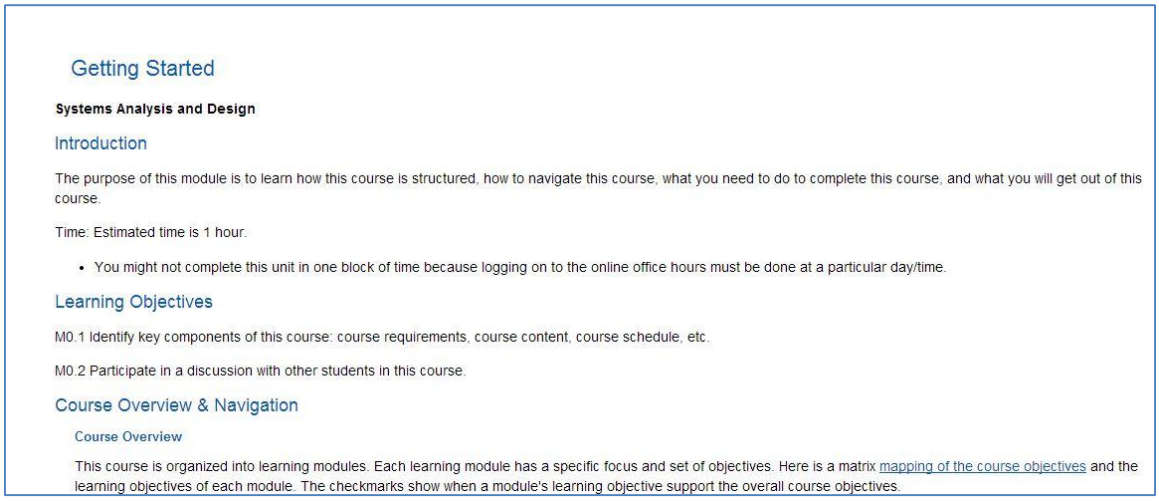
Before



After



New "Getting Started" Page (Figure 6)



Getting Started

Systems Analysis and Design

Introduction

The purpose of this module is to learn how this course is structured, how to navigate this course, what you need to do to complete this course, and what you will get out of this course.

Time: Estimated time is 1 hour.

- You might not complete this unit in one block of time because logging on to the online office hours must be done at a particular day/time.

Learning Objectives

M0.1 Identify key components of this course: course requirements, course content, course schedule, etc.

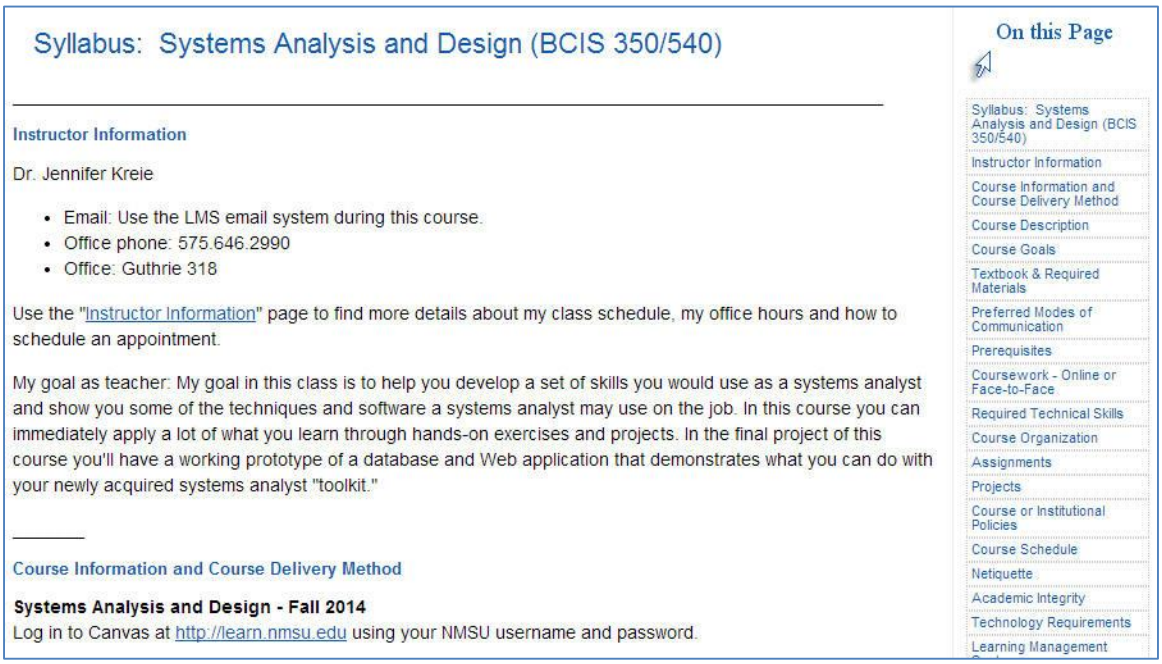
M0.2 Participate in a discussion with other students in this course.

Course Overview & Navigation

Course Overview

This course is organized into learning modules. Each learning module has a specific focus and set of objectives. Here is a matrix mapping of the course objectives and the learning objectives of each module. The checkmarks show when a module's learning objective support the overall course objectives.

Portion of the Syllabus Page (Figure 7)



Syllabus: Systems Analysis and Design (BCIS 350/540)

On this Page

Syllabus: Systems Analysis and Design (BCIS 350/540)
Instructor Information
Course Information and Course Delivery Method
Course Description
Course Goals
Textbook & Required Materials
Preferred Modes of Communication
Prerequisites
Coursework - Online or Face-to-Face
Required Technical Skills
Course Organization
Assignments
Projects
Course or Institutional Policies
Course Schedule
Netiquette
Academic Integrity
Technology Requirements
Learning Management

Instructor Information

Dr. Jennifer Kreie

- Email: Use the LMS email system during this course.
- Office phone: 575.646.2990
- Office: Guthrie 318

Use the "Instructor Information" page to find more details about my class schedule, my office hours and how to schedule an appointment.

My goal as teacher: My goal in this class is to help you develop a set of skills you would use as a systems analyst and show you some of the techniques and software a systems analyst may use on the job. In this course you can immediately apply a lot of what you learn through hands-on exercises and projects. In the final project of this course you'll have a working prototype of a database and Web application that demonstrates what you can do with your newly acquired systems analyst "toolkit."

Course Information and Course Delivery Method

Systems Analysis and Design - Fall 2014
Log in to Canvas at http://learn.nmsu.edu using your NMSU username and password.

Learning Objectives Examples (Figures 9 and 10)
The Planning Learning Module

Before redesign

Planning and selection is the first phase of the systems development life cycle.

In this learning module you will ...

- learn the PERT/CPM technique for project planning.
- learn how to use Microsoft Project to create a project plan.
- learn to write a project plan report.
- learn how to do cost-benefit analysis using a spreadsheet template. learn to document feasibility analyses.

After redesign

Planning

Introduction

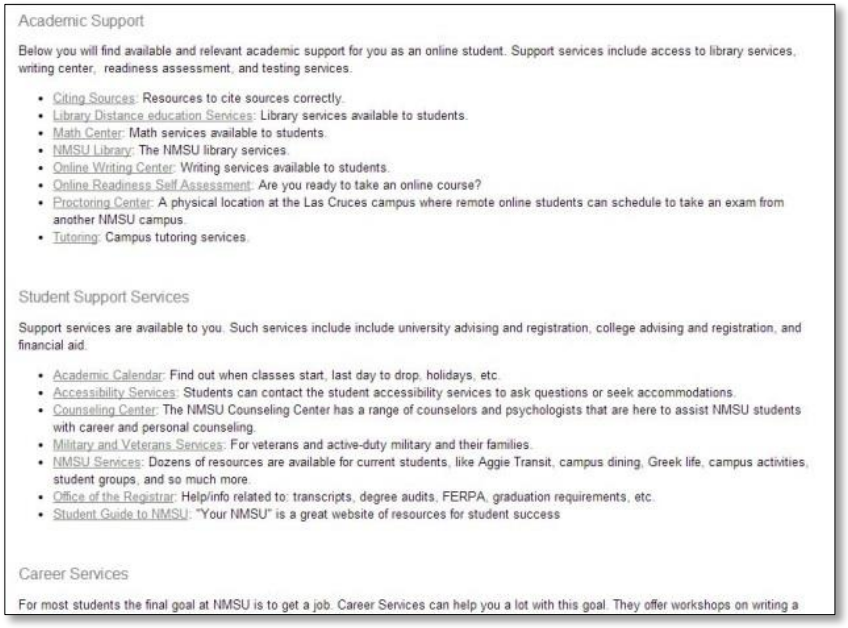
Once a project has been selected, the planning phase of the SDLC begins. In this section we learn about project management techniques, project documentation, the project repository, cost-benefit analysis, and more.

Completion time for this module is estimated to be 4 to 7 hours. Coverage of this module is scheduled for approximately two weeks.

Learning Objectives

1. Explain the systems analyst's project management activities in the planning phase of the SDLC.
2. List the project management steps.
3. Illustrate how PERT/CPM is used in project planning.
4. Conduct feasibility analyses for a project, including cost-benefit analysis using an Excel template.
5. Document the project plan.
6. Create a project repository.

Portion of University Resources Page (Figure 11)



Academic Support

Below you will find available and relevant academic support for you as an online student. Support services include access to library services, writing center, readiness assessment, and testing services.

- Citing Sources: Resources to cite sources correctly.
- Library Distance education Services: Library services available to students.
- Math Center: Math services available to students.
- NMSU Library: The NMSU library services.
- Online Writing Center: Writing services available to students.
- Online Readiness Self Assessment: Are you ready to take an online course?
- Proctoring Center: A physical location at the Las Cruces campus where remote online students can schedule to take an exam from another NMSU campus.
- Tutoring: Campus tutoring services.

Student Support Services

Support services are available to you. Such services include include university advising and registration, college advising and registration, and financial aid.

- Academic Calendar: Find out when classes start, last day to drop, holidays, etc.
- Accessibility Services: Students can contact the student accessibility services to ask questions or seek accommodations.
- Counseling Center: The NMSU Counseling Center has a range of counselors and psychologists that are here to assist NMSU students with career and personal counseling.
- Military and Veterans Services: For veterans and active-duty military and their families.
- NMSU Services: Dozens of resources are available for current students, like Aggie Transit, campus dining, Greek life, campus activities, student groups, and so much more.
- Office of the Registrar: Help/info related to: transcripts, degree audits, FERPA, graduation requirements, etc.
- Student Guide to NMSU: "Your NMSU" is a great website of resources for student success.

Career Services

For most students the final goal at NMSU is to get a job. Career Services can help you a lot with this goal. They offer workshops on writing a