ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

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March 2011
Houston, Texas

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

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ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

CONGRATULATIONS!

Recipient of the 2011 McGraw-Hill/Irwin Distinguished Paper Award

Walking Out the Door — Do Business Graduates Have The Information Technology Skills They Think They Do?

Brenda Hanson, Northwestern State University
Thomas Hanson, Northwestern State University
Begona Perez-Mira, Northwestern State University
Margaret Kilcoyne, Northwestern State University
Sue Champion, Northwestern State University

Recipient of the 2011 Federation of Business Disciplines Outstanding Educator Award

Daniel Friesen, University of North Texas, Dallas Campus

March 10, 2011
(Thursday)

7:30 a.m. – 8:30 a.m. Imperial West

ABIS and ABC-SWUS Joint Breakfast

All ABIS and ABC-SWUS members are invited to come and enjoy a great breakfast buffet!

8:30 a.m. – 10:00 a.m. Dogwood

SESSION A **Business Meeting and Distinguished Paper Presentation**

Session Chair:**Daniel Friesen,** University of North Texas at Dallas, ABIS President

Yearly Business Meeting: Old and New Business of ABIS

2011 McGraw-Hill/Irwin Distinguished Paper Presentation

Walking Out the Door — Do Business Graduates Have The Information Technology Skills They Think They Do?

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ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 10, 2011
(Thursday)

10:00 a.m. - 10:30 a.m.	Market Place/Exhibit Hall

FBD Coffee Break

Please make plans to visit the exhibits for information on the latest books and newest educational technologies. Let our exhibitors know how much we appreciate their presence and continued support!

Great Door Prize Drawings take place at **10:15 a.m.** in the Exhibit Area. *Must be present to win.*

10:30 a.m. – 12:00 p.m.	Dogwood

SESSION A **Teaching Online with Multimedia**

Session Chair: **Joselina Cheng**, University of Central Oklahoma

Incorporating Innovative Technology to Transform Teaching and Learning Corporate Finance
Joselina Cheng, University of Central Oklahoma
Maryellen Epplin, University of Central Oklahoma

Technology-Mediated or Traditional Communication Methods: Business Students' Media Choices for Receiving College-Related Information
William Wardrope, University of Central Oklahoma
Timothy R. Bridges, University of Central Oklahoma
Lisa Miller, University of Central Oklahoma

Examining the Value of Informal Current Events Discussions in Online Graduate MIS Classes
Kimberly L. Merritt, Oklahoma Christian University
Mike Estep, Cameron University
K. David Smith, Cameron University

Building a Technical Program Like No Other: From Industry to Online Classroom
Roslyn Lisenby-Turner, Southern Arkansas University Tech

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 10, 2011
(Thursday)

1:30 p.m. – 3:00 p.m. Dogwood

SESSION A **Assessing Student Skill Needs**

Session Chair: **Chynette Nealy**, University of Houston Downtown

Developing Interpersonal Skills for Successful IT Management: Design of a Graduate Communication Course
Patricia Day, University of Arkansas at Little Rock
Robert B. Mitchell, University of Arkansas at Little Rock

Rethinking Skill Development for General Business Majors
Chynette Nealy, University of Houston Downtown

Computer Literacy Requirements in Public Universities in the Southwestern Region of the U.S.: A 2010 Review
Betty Kleen, Nicholls State University
Sherry Rodrigue, Nicholls State University

Add It Up: Is Technology in Education a Numbers Game
Marcel M. Robles, Eastern Kentucky University

3:00 p.m. – 3:30 p.m. Market Place/Exhibit Hall

FBD Coffee Break– Sponsored by Southwestern Finance Association

Please make plans to visit the exhibits for information on the latest books and newest educational technologies. Let our exhibitors know how much we appreciate their presence and continued support!

Great Door Prize Drawings take place at **3:15 p.m.** in the Exhibit Area. *Must be present to win.*

3:30 p.m. - 5:00 p.m. Dogwood

SESSION A **Panel Discussion: Revitalizing Information Systems Degrees**

Session Chair: **Daniel Friesen**, University of North Texas at Dallas

Panel Members:
Dr. Michael L. Gibson, Professor & Chair Information & Logistics, University of Houston
Dr. Paul Cronan, M.D. Matthews Endowed Chair in Information Systems, University of Arkansas
Dr. Tom Roberts, Clifford Ray King Endowed Professor in Information Systems, Louisiana Tech University
Dr. Ron Hopkins, Global Business Sys MGR Shell Downstream, Inc., Shell Global
Mark Stinnett, Assistant Director of Information Technology, City of Houston

5:30 p.m. – 7:00 p.m. Market Place/Exhibit Hall

FBD Meet and Greet Social

Everyone is invited to attend this FBD conference-wide social event. Visit with long-time friends and make new ones as you enjoy light appetizers. A Cash Bar is available and a limited number of drink tickets will also be distributed. Stop by to relax and wind down from the day's conference activities before heading out to other association events, dinner, or the surrounding artistic activities.

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 11, 2011
(Friday)

8:30 a.m. - 10:00 a.m. Dogwood

SESSION A **Teamwork and Decision Making**

Session Chair: **Amjad Abdullat**, West Texas A&M University

Collaborative Learning
Jacob Ogunlade, Strayer University

Decision Theory and Competitive Strategy
Jacob Ogunlade, Strayer University

Promote Critical Thinking in Your Business Information Systems Course
Jim Larsgaard, Eastern Kentucky University

Teaching Data Envelopment Analysis in an Undergraduate Management Science Class
Daniel Friesen, University of North Texas at Dallas

10:00 a.m. - 10:30 a.m. Market Place/Exhibit Hall

FBD Coffee Break

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ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 11, 2011
(Friday)

10:30 a.m. – 12:00 p.m. Dogwood

SESSION A **E-Learning and Web Design**

Session Chair: **Mukesh Srivastava**, University of Mary Washington

Website Characteristics and Their Influences: A Review on Web Design
Meng Shi, Stephen F. Austin State University

Virtual Versus Onsite Store: The Impacts of Website Information Quality on Online Users' Purchasing Behaviors
Meng Shi, Stephen F. Austin State University

A Comparison of Learning Style Models, Cluster Analysis and eLearning Performance: An Empirical Study
Mukesh Srivastava, University of Mary Washington

Online Education: Student Characteristics as Predictors of Success
Irma Jones, University of Texas at Brownsville and Texas Southmost College
Janna Arney, University of Texas at Brownsville and Texas Southmost College

1:30 p.m. – 3:00 p.m. Dogwood

SESSION A **Technology: Security and Performance Issues**

Session Chair: **Beverly Oswalt**, University of Central Arkansas

Perceived or Real Risks Using Smartphones
S. Ann Wilson, Stephen F. Austin State University
Michael York, Stephen F. Austin State University

Calculating the Cost of Spam to Academic Institutions
Adnan Omar, Southern University at New Orleans
Alfred Samman, Louisiana State University

The Role of Trust in Online Community
Lulu Zhang, University of Texas at Arlington

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 11, 2011
(Friday)

3:00 p.m. – 3:30 p.m.	Market Place/Exhibit Hall

FBD Coffee Break

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3:30 p.m. – 5:00 p.m.	Dogwood

SESSION A **Course Development, Improvement and Accreditation Compliance**

Session Chair: **Carla J. Barber**, University of Central Arkansas

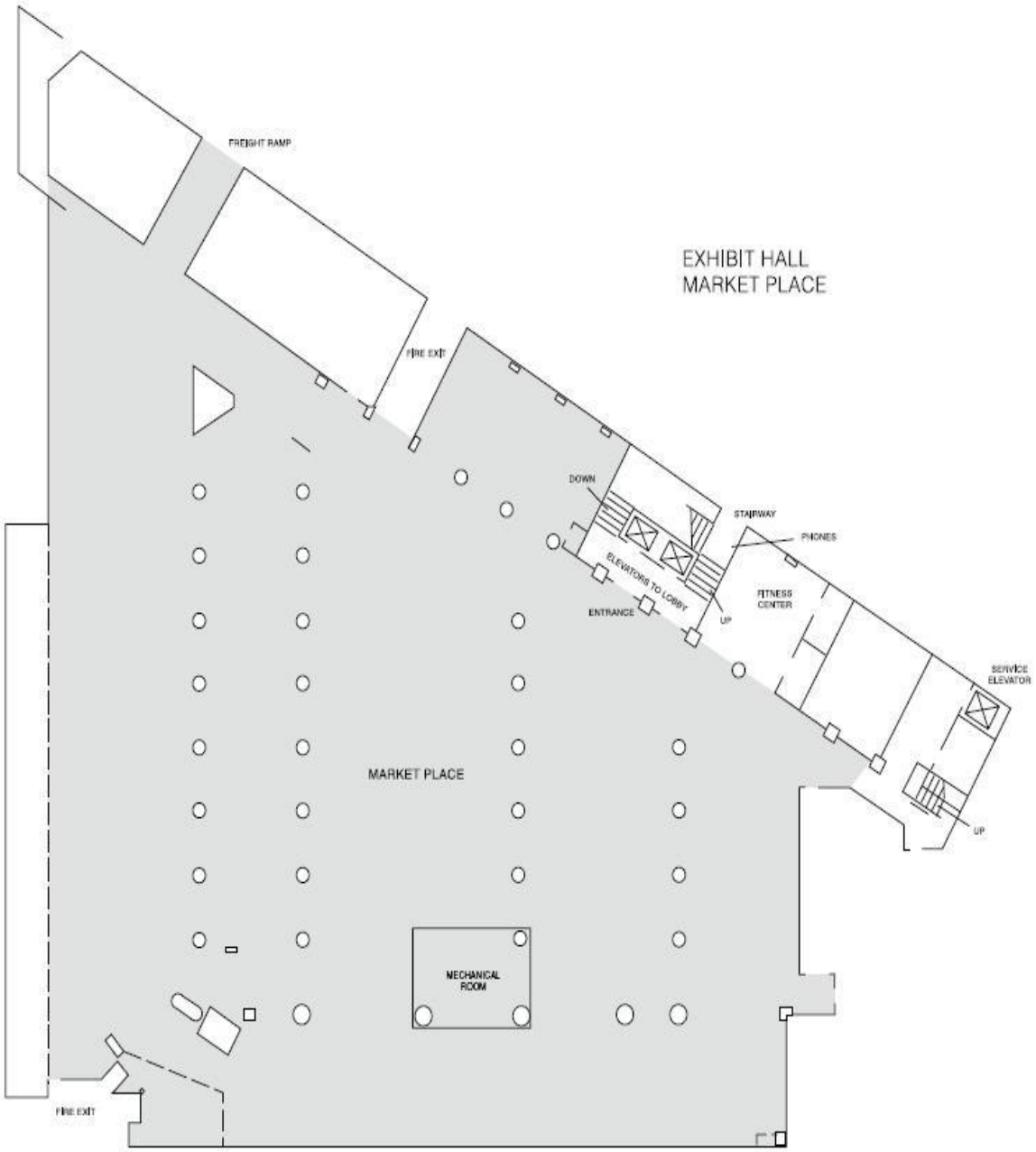
A Qualitative Assessment Model for Business Information Systems Programs for Accreditation Efforts
Randall McCoy, Morehead State University

A Comparative Study of MIS Programs at AACSB Peer and Aspirant Institutions
Beverly Oswalt, University of Central Arkansas
Carla J. Barber, University of Central Arkansas
Lea Anne Smith, University of Central Arkansas

Using Social Network Analysis to Leverage the Industrial Advisory Board for Regional Institutions: Program Reflection and Improvement
Jeffry Babb, West Texas A&M University
Amjad Abdullat, West Texas A&M University

Designing Data and Communication (Convergent Technology) Class Using Theory and Hands-On Lab Exercises
Robert Ho, South Texas College
Dawn Taylor, South Texas College
Sam Y. Sung, South Texas College
Redjo Tjhiong-Sie, BizTech Institute

Hyatt Regency Houston
Floor Plan



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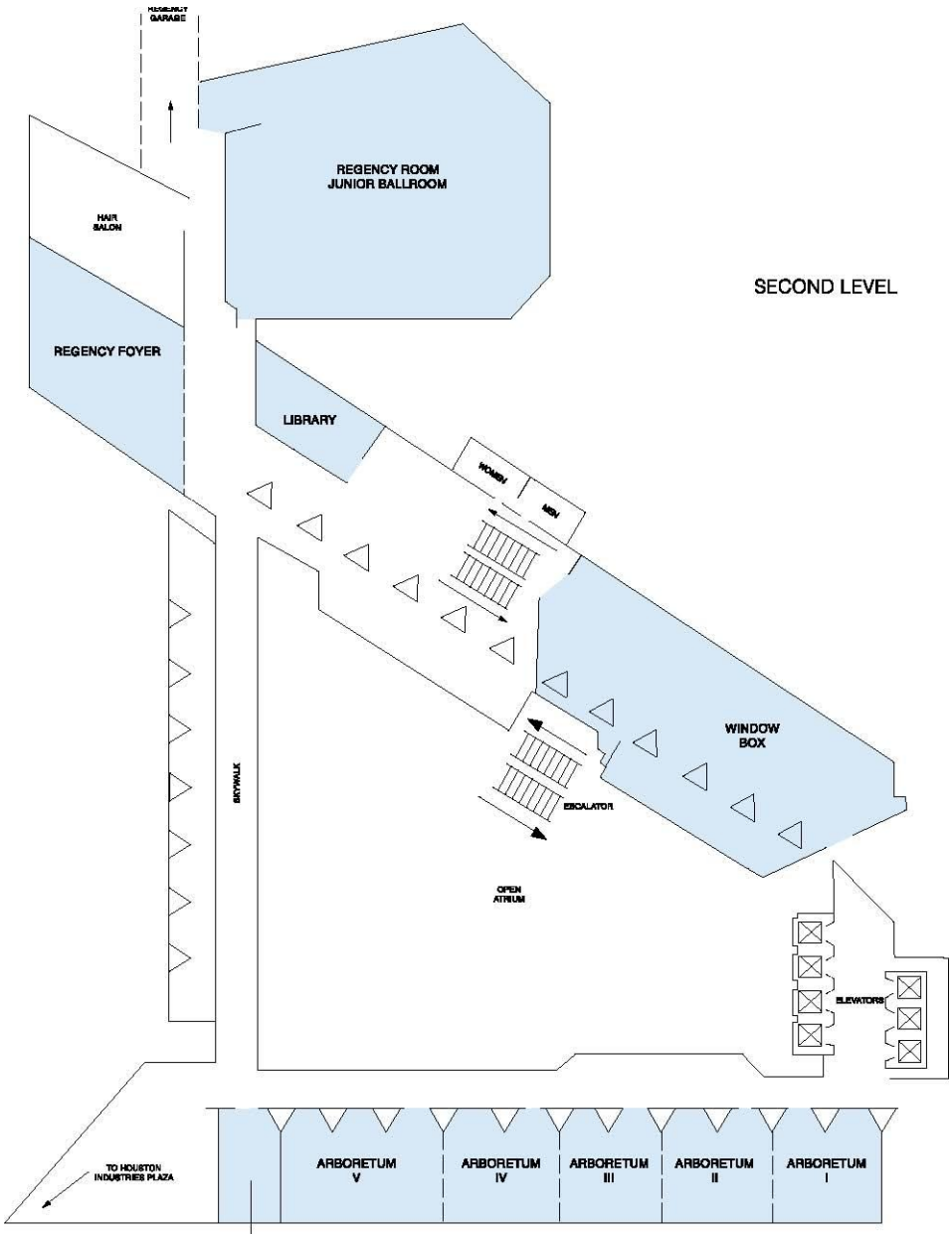

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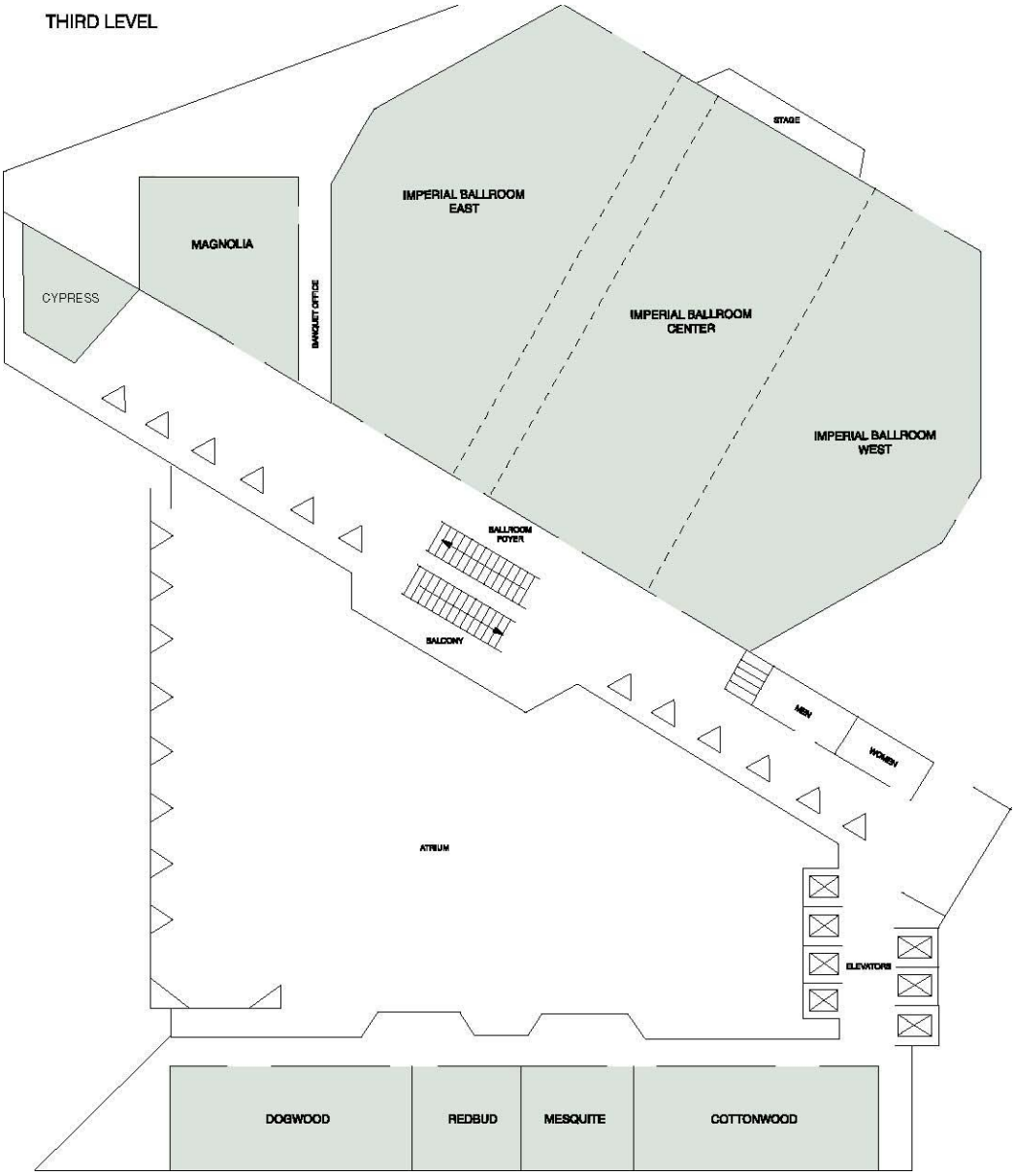

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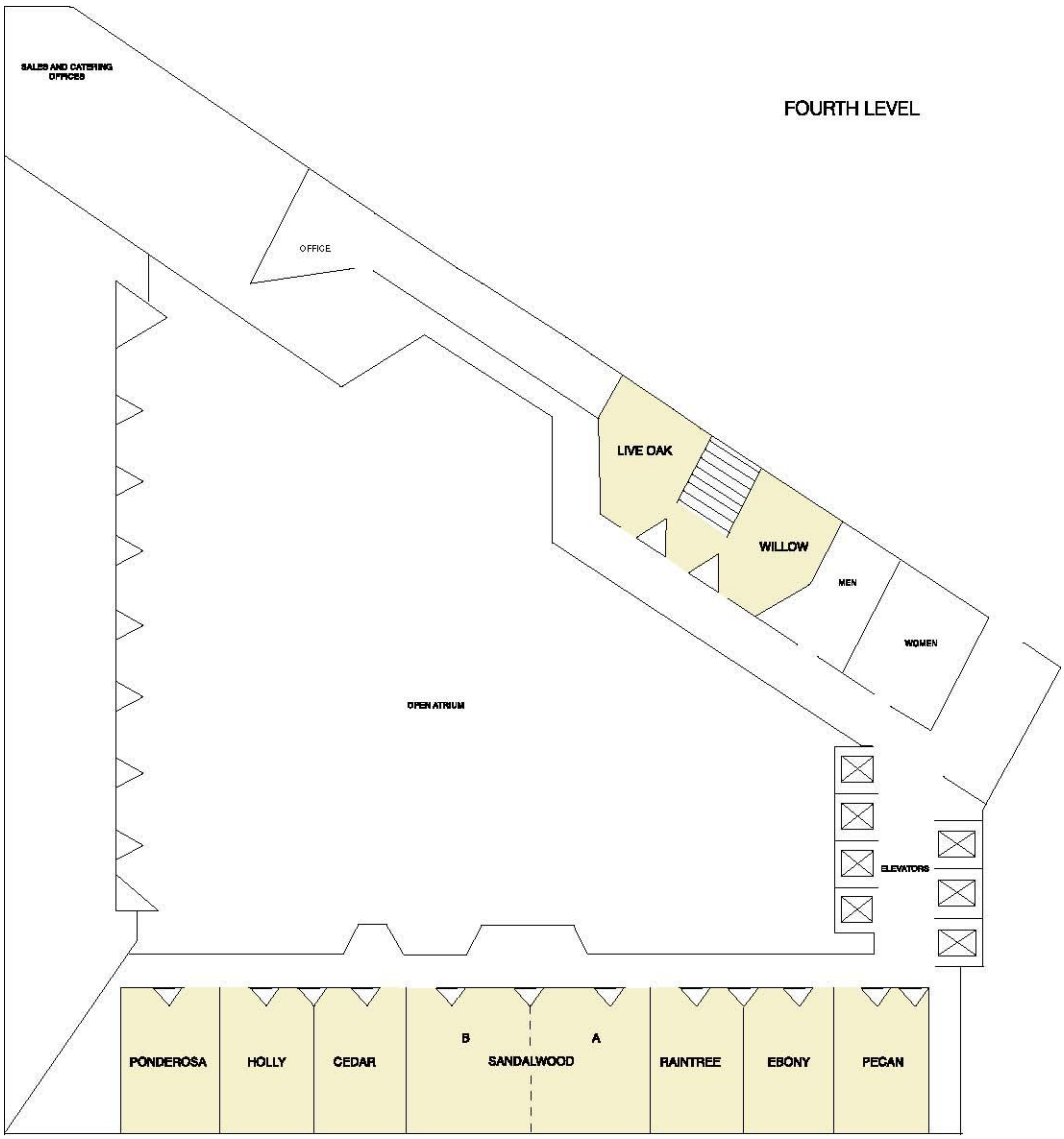

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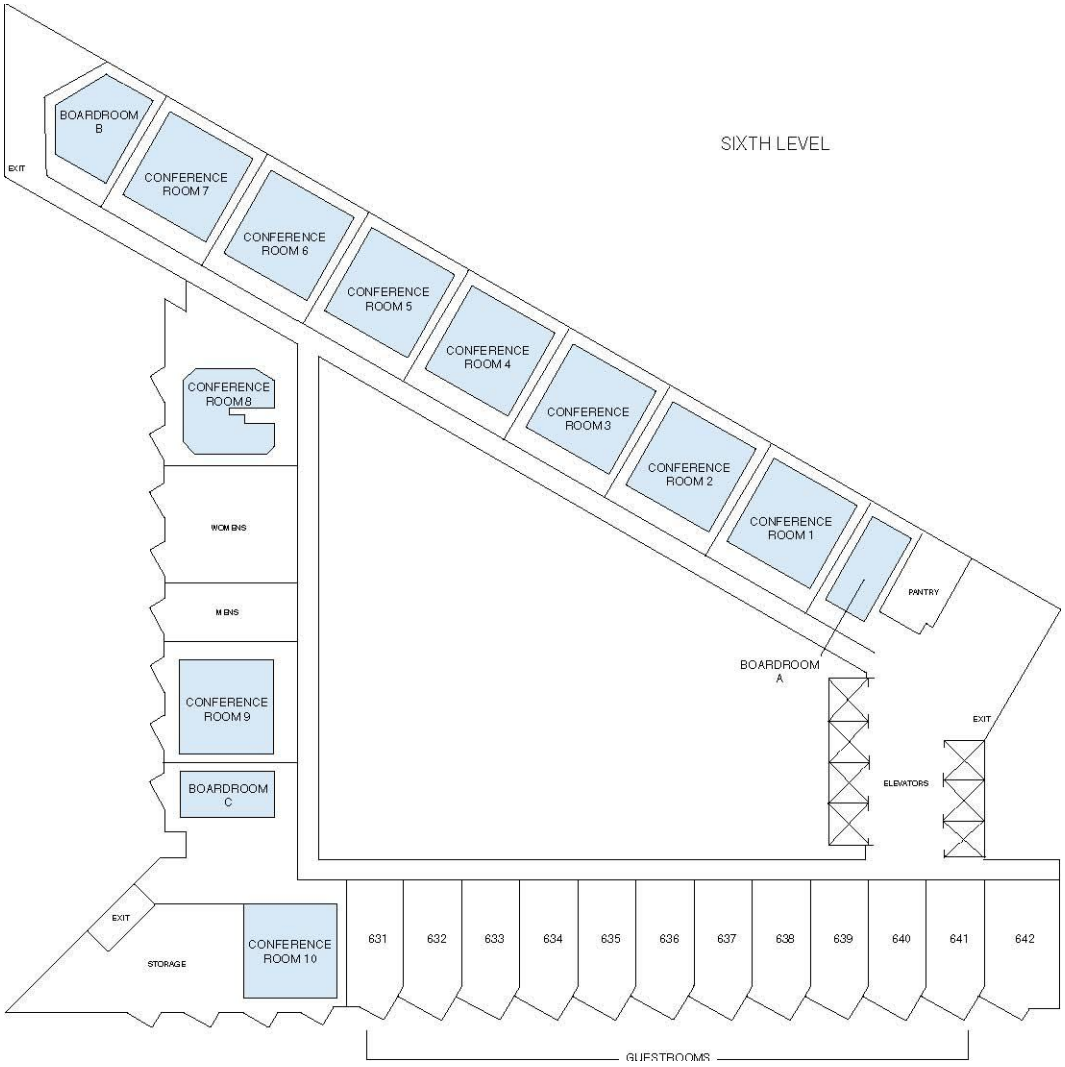

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Walking Out the Door— Do Business Graduates Have The Information Technology Skills They Think They Do?

Brenda Hanson *(Corresponding Author)*, Northwestern State University
Tom Hanson, Northwestern State University
Begona Perez-Mira, Northwestern State University
Margaret Kilcoyne, Northwestern State University
Sue Champion, Northwestern State University

Introduction

Desirable knowledge and skills needed by college graduates will vary by stakeholders. These stakeholders include employers, graduates, faculty, university, departments, and current students. Coll and Zegwaard (2006) reported recent graduate's biggest increase in perceived importance over a ten year time period was for computer literacy with written communication being perceived the lowest. As a major stakeholder, graduate's perceptions of the importance of these skills dramatically affect the attention given during their undergraduate preparation.

Employers are seeking a high-caliber college graduate. They need college graduates who possess knowledge across all disciplines (breadth) and mastery of a specific discipline (depth) (Hanneman, & Gardner, 2010). As reported in a study conducted by Michigan State University (MSU) entitled "Recruiting Trends 2009-2010" (Gardner, 2010), employers appear to be expanding opportunities across all majors with a breakdown of business disciplines comprising approximately 3% to 4%.

Required job knowledge and skills have changed. Hanneman and Gardner (2010) surveyed business and industry to identify knowledge and skills needed by college graduates. The following skills were identified: the ability to use higher-order thinking, ability to communicate ideas, ability to function as a member and leader of teams, and ability to utilize technology to make or save the company money. Companies were asked to list the desired qualities and skills needed by applicants. Listed among the top eight desired skills and qualities were computer skills, communication skills, and leadership skills. (CollegeGrad.com, 2009) For business (other), finance, and accounting majors, Hanneman and Gardner (2010) reported that employers identified the following desired skills and qualities as needed by graduates: engage in continuous learning; analyze, evaluate, and interpret data; and build professional relationships. The executive summary of the MSU study (Gardner, 2010) reports a business shift in the demand for business majors to possess the technology skills aligned with the companies repositioning for more Internet business and to seek candidates with acumen in these areas. Adding to the demands for extensive skills and training is the increasing attention given to social media by those involved in the hiring process (Gardner, 2010).

Adhering to accreditation standards, the colleges of business or schools of business are required to provide documentation of student learning experiences in the areas of communication, ethics, information technology (computer skills), and domestic and global environments (global skills). AACSBI does not require a specific course for each area; however, all of the business courses are required to include these vital areas. (AACSBI, 2010)

To adhere to the accreditation standards, one small rural southern university (public four years) School of Business integrates these skills beginning with freshman level courses. For example, all majors are required to take two computer-specific courses-- one at the freshman level and one at the junior level where technology-related knowledge and skills are stressed. Other courses integrate technology-related knowledge and skills through assignments and projects. This being said, the authors wanted to measure the actual skill levels acquired and the students' perceptions of their skills abilities.

Therefore, the purpose of this study was to determine students' perceptions of their business technology knowledge and skills and to determine whether students are as competent in business technology knowledge and skills as they perceive themselves to be.

Population and Data Collection

During spring 2010, 73 students were enrolled in MGT 4300--Management Policy (capstone course). This course is a required course in the accounting degree, the business administration degree, and the

computer information systems degree at a small rural southern university. Students enrolled in this course must be graduating at the end of the semester in which they are taking this course.

Of the 73 enrolled students, a total of six were eliminated due to various reasons; one student withdrew from the course, one student was located in Florida, and one student became ill receiving an incomplete, and three students failed to complete all three assessments. Sixty-seven students completed all three instruments

Instrument and Methodology

For this study three instruments were utilized. First, permission was received to use and modify an existing instrument to measure students' perceptions of their technology abilities (Grant, Malloy & Murphy, 2009). The survey was presented as part of the MGT 4300-Management Policy course and made available to the students via the Blackboard Internet delivery system.

Part one of the survey asked the students for demographic information--gender, age, major, mother's highest education level earned, father's highest education level earned, type of high school attended (public school, private school, or home school), hometown, and state. Part two asked the students to rate from *1-High Skill* to *5-No Skill* their overall computer application skills. Students were asked if they owned or did their family have access to a computer and how long they owned or had access to a family computer. Students were asked if their high school required a course in basic computer skills and if they chose a course in basic computer skills as an elective in high school. Part three asked the students to indicate all software that they had used in their courses or for personal purposes. Part 4 asked the students to rate their proficiency from *1- High Skill* to 5- *Little or No Skill* in file operations, MS Word, MS Excel, MS PowerPoint, E-mail, MS Access, Web Page Development, and Application programming. Part 5 asked the students to indicate ALL tasks that they were familiar with as it relates to the following applications--MS Word Processing, Excel Spreadsheets, MS PowerPoint, and MS Access.

After the initial survey was collected, a second instrument was administered via computer as an undergraduate computer skills assessment pre-test originally developed by Creighton, Kilcoyne, Tarver, and Wright (2006) to assess skills in the CIS 1800 course. This assessment test was modified for the current study using preloaded databases, documents, and various other items for the students to use in completing the required tasks.

After completion of the application skills assessment, a post assessment was given to the students. The students were asked to rate their proficiency from *1-High Skill* to 5- *Little or No Skill* in the following areas: Word, Excel, Access, PowerPoint, computer file operations, and overall skill in computer applications.

Data Analysis

Descriptive statistics and statistical data analysis were performed. A Pearson product-moment correlation coefficient, measuring the strength of the relationship between two continuous variables (Pearson, 1896), was computed to assess the relationship between the students' perceptions and their actual performance.

Demographics

Out of the 73 enrolled students, only 67 completed all of the required parts of the study. Students from three different majors were included in the sample, Business, Accounting, and Computer Information Systems (CIS). In terms of percentages, Accounting students comprised 19.4% of the sample; 13.9% of the sample were CIS students; and finally, 59.7% of the sample included the Business students. In terms of gender, females were represented a little bit higher with 58% of the sample. Participant students were for the most part, 20 to 25 years old (85%).

Differences by Major

As stated previously, step 1 of the study involved a pre-test of students' perceptions of their own computer skills; step 2 involved a skills test assessment, and in step 3, after students completed the skills assessment test, they were asked to rate their skills again. Pearson correlations were calculated to observe the relationship between these three steps. A Paired T-test was conducted to observe the difference between the pre-students' perceptions of their skills and the post perceptions.

Pearson correlations between the students' perceptions and the graded skill test did not provide any significant relationships when all the students were included in the sample. However, when the sample was divided by Major, only one correlation was significant. The EXCEL skills perceptions of CIS students were significantly correlated with the grade they received in the Email skill test (see Table 1 for results).

Performance skills were then compared with the students' perceptions of their skills after they took the assessment test. Results from this comparison increased the number of significant relationships. When all majors were included in the analysis, we found significant relationships between students' perceptions of their EXCEL skill and the actual performance, their perceptions of ACCESS skills and EXCEL performance, and finally, their perceptions of ACCESS skills and ACCESS performance (See table 2 for results).

When the sample was divided by major, no significant relationships were found for the Accounting group. However, for the CIS group, we found significant relationships between the students' perceptions of their skill level in WORD and their actual performance in ACCESS; as well as the students' perceptions of their skill level in PowerPoint and their actual performance in PowerPoint and ACCESS (see Table 3).

Results from the Business Administration group were significant between the students' perceptions of their skill level in ACCESS and their actual performance in EXCEL and ACCESS; as well as students' perceptions of their skill level in PowerPoint and their actual PowerPoint performance (see Table 4).

Finally, Paired T-Tests were conducted for all observations matching both the pre and post students' perception skills. Results from this analysis showed that the means were significantly different for all the pairs at the .05 level of analysis (see Table 5 for results).

Discussion and Conclusions

An important objective of this study is to provide insight into how computer skills are being acquired by students graduating from Business Schools. The technology component is now a very important part of AACSB accreditation, and as such, it has to be measured and monitored over different periods of time and multiple graduating classes. This study was developed to monitor part of this AACSB required technology component. We believe that students' perceptions of their acquired skills are important since they are major stakeholders in their education. We wanted to know if students perceived that they had sufficient computer skills after reaching their last year. We also believe that their perceptions may or may not match the required needs of a secondary group of stakeholders—faculty. Hence, this study examined self-ratings of computer skills ability and actual performance of computer skill tasks as measured by faculty using the four most commonly used application packages: Word, Excel, PowerPoint, and Access. According to these results, students perceive their computer skills to be medium to high as evidenced by the means obtained in both the pre- and post-test perceptions; however, these averages changed significantly after the performance skills test was administered. Students modified the scores on their perceived computer skills as evidenced by a significant change in the means. Students scored themselves lower in their computer skills after the performance test was completed.

The relationship between their actual, graded performance and the self-rating of their skills appeared significant only after the skills test was performed. Results suggest that students do think that they have the knowledge needed to complete any task with the specific software package tested; however, the correlations between their performance and their ratings only hold significance for Excel and Access when all majors were included in the sample; for Access and PowerPoint for BUAD majors; and PowerPoint for CIS majors. The ultimate goal for any business school would be to produce a graduate whose perception of computer skills and actual performance rated equally. If this match does not happen, it raises issues that require attention not only from faculty in terms of instruction but also by the administration in terms of curriculum requirements. It is important to mention that this group of students—the sample used for this study—started their degree before the technology component was modified to be reflective of technology changes based business and industry recommendations as well as provide support documentation for accreditation agencies. For this reason, the students may not have been exposed to the knowledge and skills tested in this study since the knowledge and skills tested may not have yet been integrated throughout the courses included in the curriculum.

Therefore, it is imperative that we keep testing and monitoring these students, not only at the capstone-class level, but also at the sophomore- and/or junior-level to make sure that they are receiving the required computer skills instruction and that their perceptions of those skills are being modified along the same lines. Testing students at lower levels would give faculty and administrators a chance to modify curriculum and/or instruction to better meet the student needs and remedy shortcomings before graduating underprepared students.

References

The Association to Advance Collegiate Schools of Business-International [AACSBI]. (2010, January 1). *AACSB international eligibility procedures and accreditation standards for business accreditation*. Tampa, FL Author, 73.

Coll, R., & Zegwaard, K. (2006). Perceptions of desirable graduate competencies for science and technology new graduates. *Research in Science & Technological Education*, 24(1), 29-58. doi: 10.180/02635140500485340.

CollegeGrad.com (2009, April 21). CollegeGrad.com names top entry-level employers for 2009 – entry-level job opportunities remain stable. Retrieved August 20, 2009, from http://www.collegegrad.com/press/top-entry-level-employers-for-2009-entry-level-job-opportunities-remain-stable.shtml

Creighton, W., Kilcoyne, M., Tarver, R., & Wright, S. (2006, Spring). Computer literacy levels of students enrolling in a post-secondary computer applications/ information technology course. Information *Technology, Learning, and Performance Journal [Online], 24*(1), 15-23. Retrieved from http://www.osra.org/itlpj/ vol24no1.html

Grant, D. M., Malloy, A. D., & Murphy, M. C. (2009). A comparison of student perceptions of their computer skills to their actual abilities. *Journal of Information Technology Education*, 8, 141-160.

Hanneman, L., & Gardner, P.D. (2010, February). *Under the Economic Turmoil a Skills Gap Simmers [CERI Research Brief 1-2010]*. Michigan State University: Collegiate Employment Research Institute. Retrieved August 28, 2010, http://www.ceri.msu.edu/wp-content/uploads/2010/01/skillsabrief1-2010.pdf

Gardner, P.D. (2010). Recruiting trends 2009-2010-executive summary. Michigan State University, Collegiate Employment Research Institute. Retrieved September 28, 2010, from http://www.ceri.msu.edu/recruiting-trends/recruiting-trends-2009-2010/executive-summary-2009-2010/

Gardner, P.D. (2010). Recruiting trends 2009-2010. Michigan State University, Collegiate Employment Research Institute. Retrieved September 28, 2010, from http://ceri.msu.edu/wp-content/uploads/2010/01/RT20092010.pdf

Pearson, K. (1896) Mathematical contributions to the theory of evolution. III. Regression, heredity and panmixia. *Philos. Trans. Royal Soc. London Ser. A*, 187, 253–318

TABLE 1 – Performance vs. Perception – CIS Majors PRETEST

Performance vs. Perception Pre-test		WORD Perception	EXCEL Perception	PPT Perception	Email Perception	ACCESS Perception
Word Performance	Pearson Correlation	.327	.756	.982	.982	.982
	Sig. (2-tailed)	.788	.454	.121	.121	.121
EMAIL Performance	Pearson Correlation	-.221	-.144	.000	.000	.000
	Sig. (2-tailed)	.721	.817	1.000	1.000	1.000
EXCEL Performance	Pearson Correlation	-.360	-.394	-.466	**-.766***	-.350
	Sig. (2-tailed)	.341	.294	.207	**.016**	.355
Power Point Performance	Pearson Correlation	-.562	-.206	.275	.275	.000
	Sig. (2-tailed)	.324	.739	.654	.654	1.000
ACCESS Performance	Pearson Correlation	-.152	-.322	.440	.[a]	.088
	Sig. (2-tailed)	.718	.437	.275	.000	.836

**. Correlation is significant at the 0.05 level (2-tailed).*

a. Cannot be computed because at least one of the variables is constant.

TABLE 2 – Performance vs. Perception – ALL Majors POST-TEST

		WORD Perception	EXCEL Perception	ACCESS Perception	PPT Perception
Word Performance	Pearson Correlation	-.258	-.162	-.209	-.011
	Sig. (2-tailed)	.067	.256	.141	.939
EXCEL Performance	Pearson Correlation	-.083	**-.325***	**-.533****	-.189
	Sig. (2-tailed)	.561	**.020**	**.000**	.183
Power Point Performance	Pearson Correlation	-.211	-.206	.108	-.238
	Sig. (2-tailed)	.125	.134	.436	.083
ACCESS Performance	Pearson Correlation	.277	-.240	**-.688****	.027
	Sig. (2-tailed)	.237	.309	**.001**	.911

**. Correlation is significant at the 0.05 level (2-tailed).*

***. Correlation is significant at the 0.01 level (2-tailed).*

TABLE 3 – Performance vs. Perception – CIS POST-TEST

		WORD Perception	EXCEL Perception	ACCESS Perception	PPT Perception
Word Performance	Pearson Correlation	-.327	.756	.756	.655
	Sig. (2-tailed)	.788	.454	.454	.546
EXCEL Performance	Pearson Correlation	.655	-.425	-.425	.102
	Sig. (2-tailed)	.056	.254	.254	.794
Power Point Performance	Pearson Correlation	.562	.074	-.074	**.963****
	Sig. (2-tailed)	.324	.906	.906	**.008**
ACCESS Performance	Pearson Correlation	**.762***	.000	.000	**.792***
	Sig. (2-tailed)	**.028**	1.000	1.000	**.019**

**. Correlation is significant at the 0.05 level (2-tailed).*

***. Correlation is significant at the 0.01 level (2-tailed).*

TABLE 4 – Performance vs. Perception – BUAD POST-TEST

		WORD Perception	EXCEL Perception	ACCESS Perception	PPT Perception
Word Performance	Pearson Correlation	-.142	-.084	-.054	.084
	Sig. (2-tailed)	.402	.622	.750	.620
EXCEL Performance	Pearson Correlation	-.146	-.152	**-.571****	-.008
	Sig. (2-tailed)	.442	.421	**.001**	.967
Power Point Performance	Pearson Correlation	-.183	-.291	.150	**-.347***
	Sig. (2-tailed)	.279	.081	.376	**.035**
ACCESS Performance	Pearson Correlation	.462	-.053	**-.790***	.448
	Sig. (2-tailed)	.249	.900	**.020**	.266

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

TABLE 5 – PAIRED T-TEST PRE/POST PERCEPTIONS

		POST-WORD Perception
PRE - Word Perception	T -TEST	-5.212
	Sig. (2-tailed)	.000
PRE - EXCEL Perception	T -TEST	-2.928
	Sig. (2-tailed)	.005
PRE - Power Point Perception	T -TEST	-2.529
	Sig. (2-tailed)	.014
PRE - ACCESS Perception	T -TEST	-3.559
	Sig. (2-tailed)	.001

ADD IT UP: IS TECHNOLOGY IN EDUCATION A NUMBERS GAME?

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Introduction

People have been counting for thousands of years. While arithmetic itself has stayed the same, the tools that people use to calculate have changed significantly.

As high school students enter college, are they ready to *think* numerically? Can students put pencil to paper to calculate a math problem? Or do they only know how to put fingers to keyboard? As high school educators are increasingly using math, accounting, and statistical software programs, are students understanding the basic foundations of number calculations?

Computer literacy has evolved into "information literacy" as technology continues to provide increased access to information via the Internet. Students are developing and perfecting skills to search, retrieve, analyze, evaluate, and use information (Ehrmann, 2004); but at what expense? As technology use increases in the K-12 classrooms and "computer literacy" has become the new norm, is "number literacy" on the decline?

Impact of Using Computers vs. the "Pencil and Paper" Method

Technologies, such as the abacus, slide rule, adding machine, calculator, spreadsheet, and math software have influenced computations throughout the past. The evolution has continued today with further computer advancements, such as PDAs, I-pads, and even cell phones. Technology of the future will continue to reshape quantitative memorization (doing calculations in one's head) and influence the way we teach and learn business math, statistics, accounting, finance, and other quantitative courses. Teachers have taught reading, writing, and arithmetic by using everything from slate chalkboards and overhead transparencies to computer projectors and smart boards. We know that technology has influenced how we "think" and how we teach students to "think," but several questions now beg discussion:

1. What technologies are impacting business education today?
2. How has technology affected the simple rote acts of computing (adding, subtracting, multiplying, and dividing)?
3. How has technology affected the memorization of formulas, concepts, and theories in business jobs?
4. How have/do/will technologies affect the teaching process of quantitative subjects at all levels of education?

Both the Traditional "Paper and Pencil" and Technology Are Needed

Can accountants who have recently graduated do a depreciation schedule with paper and pencil? Many would say no, but they can put the numbers into the software program that will print out any financial statement required. At the other end of the spectrum, one study showed that many students and teachers were not familiar with course management software programs like Blackboard and/or how to use the latest technology tools in teaching and learning, such as a smart board (Baker, Shi, & Stock, 2006) to demonstrate basic number concepts or even open electronic files. Business teachers need to know how to use the technologies and how to use them for strategic instruction. Bartholomew (2004) suggests that we need to analyze what we are really trying to accomplish through the use of technology in the classroom.

Another detriment to the technology revolution is current employees who have been in the field for several years, but do not have the necessary computer skills to use the ever changing technology; and they may not have a will to learn it.

Instructional Strategies Must Lead to Student Success

Children in pre-school and elementary school learn to add and subtract using traditional methods of "pencil and paper" or using objects as counting items. These young students do not use calculators or computers to solve the equation. They learn the basics first. Baker, Shi, and Stock (2006) found that college teachers need to teach both technology and traditional "paper and pencil" fundamentals as they prepare well-rounded students for a successful career in business. As many businesses change, computers are a mandatory advancement from the traditional pencil and paper; but employees should have already learned the fundamentals, using the traditional method (pencil and paper) earlier in life, and now be

able to merge what they already know with the changing software and technology.

Brody and Coulter (2002) discuss the concepts of "mindfulness" and the "Seven Myths of Learning" in an effort to prepare graduating seniors for the real world. "Mindfulness" is the overarching ability to be open and aware of new information and categories, as well as being approachable to the acceptance of more than one view while focusing on process before outcome. For example, professors need to relate classroom material to actual events that may or have occurred in the accounting profession, rather than just the textbook case or academic scenario. After the ethical issues with Enron and Worldcom, the accounting field is seeing increased emphasis on better preparing accounting students for the workplace—beyond just the technical aspect. This idea emphasizes the understanding of what students have learned along with the ability to apply it in ways that are applicable to the situation at that time. The process of retaining information from previous academic studies is still important and will be used in the process. Further, Pescovitz (2008) and Nimwegen (2008) found that using the tradition "paper and pencil" boosts creativity, rather than using the computer. Perhaps using brain power and memory, along with the action of writing everything down on paper, as opposed to just seeing slides on a screen and/or participating in software training, helps students to develop the depth of knowledge and understanding of the subject content.

Qualifications Employers Want from New College Graduates

The question then becomes are companies hiring employees based more on fundamentals of technology use compared to the traditional "paper and pencil" knowledge or not. While qualifications for jobs in fields like management are constantly changing, the foundational concepts and theories remain the same. The change comes from the amount of technology that is required as the years pass. McFadden and Gabric (2001) conducted a study to determine significant differences between employer and employee beliefs as to the most important skills to have for entry-level jobs, examining general skills and technical skills. The results indicated that both employers and employees valued general skills more than technical skills when hiring job applicants. The overall results of the numerous experiments performed showed that today's employer values general management skill and positive personality traits more than technical skills. Research shows over and over, year after year, that the quality that employers want from new employees is their ability to communicate effectively and have interpersonal skills (Baugh, Davis, Kovacs, Scarpino, & Wood, 2010; Stevens, 2005; Wyer, 1993), whether they are using traditional or technology means (Stevens, 2005).

Interestingly, over the past few decades, accounting students have also been evolving from the stereotypical number-crunching bookworms to the problem-solving critical thinkers that employers want. So, in addition to basic principles of accounting, employers are looking for employees who use critical and creative thinking. Adding to the tedious task of balancing ledgers with "pencil and paper," now students need to think critically about the numbers and reason the meaning from the context of the situation, rather than just applying the rules of accounting, for them to become professional accountants (Wyer, 1993).

Further, concentrating solely on business graduates, Tanyel, Mitchell, and McAlum (1999) found that prospective employers value creative and critical thinking over the use of technology. Even though employers still rank computer competency and other technological skills highly, they found that the traditional methods of learning and content still are more important in leading change in the business world.

Many business professionals prefer qualities even different from content knowledge or software skills. They want potential hires to have traits such as accountability, ethical values, interpersonal skills, communication skills, time management abilities, teamwork cooperation, decision-making performance, and analytical skills. Whereas, similarly, university faculty noted that the most important qualities might be accountability, communication skills, interpersonal skills, critical and creative thinking, time management, decision-making, and analytical ability (Tanyel, Mitchell, & McAlum, 1999).

Research also shows that employers want people who can provide comprehension of technical documentation, in addition to being a team player, and also being able to communicate with all levels of management. While knowledge of computer programming and technology is important, the interpersonal skills surpass the technical skills in desired employee qualifications (Baugh, Davis, Kovacs, Scarpino, & Wood, 2010).

Most students only develop about 10% of their skills within their academic studies. The only way to learn and master skills is to practice them. Any experience, whether part-time work, social interactions, or extra-curricular activities are an opportunity to develop skills. Modern employers want employees that exemplify self-confidence, self-awareness, communication skills, critical thinking skills, and the ability to fit into a team. Getting a degree does not necessarily help develop these skills. Experience is also a major way for new graduates to develop these transferrable skills. Within the learning environment, students are often confronted with contrived situations in which to learn; this does not follow the pattern of working in the real world, and leaves little critical thinking to the imagination. Therefore, in addition to the benefits of content knowledge in the traditional education, real world work experience is critical (Shepherd, 1998). Employers from several large accounting firms agreed it was important for college graduates to develop critical and creative thinking skills necessary for succeeding in business (Wyer, 1993). Students should be placed in scenarios that give undue emphasis to the basics in learning new information that leads to rigidity in decision making and scenarios that emphasize that decision makers "know how to know" (Brody & Coulter, 2002). They need to learn to be flexible and to use their own judgment because no two businesses are exactly the same.

Businesses in society today are moving away from the traditional method of "pencil and paper" to heavier use of computer software in their accounting and financial practices. The traditional method and the use of software are both effective and accurate, but neither is perfect nor flawless. However, most of the time, using software is more efficient, less time-consuming, and virtually error-free. Accordingly, some jobs will require more technical skills than others. Businesses who offer products online, reaching current and potential customers, may want job applicants with computer skills in addition to marketing skills. E-commerce businesses may require new call-center employees who are computer savvy and need to communicate with people on the telephone to fix technology problems. These employees will be using computers and telephones, rather than the traditional method of "pencil and paper." These businesses will want to hire people who already have the computer skills so they can easily learn the necessary software of the business. This type of move towards technology increases a business' demand for hiring business students who already have the computer skills and software knowledge to learn new technology (Leiber, 2010).

Conversely, many management, accounting, and other business positions want employees to enter the workforce with an understanding of the basics of financial concepts, managerial theories, and fundamentals of the field (Bellamy & Mativo, 2010). Oftentimes, students do not realize the importance of a subject. They think they will never use those concepts--until they get into a job that has them using a ruler and figuring dimensions and calculating orders. At that point, the former student realizes the importance of math and theorems. Employers want to hire college graduates who have computer competency and the necessary technology skills for solving real-world problems, but those potential employees also need to know their field of study to achieve success on the job (Bartholomew, 2004).

Students today need to know how to use computers; but more importantly, they need to know how to use technology effectively and efficiently as a tool for communication, research, operations, scheduling, problem-solving, and decision-making.

Conclusions and Recommendations

So, do we need college graduates in accounting, or do we need to hire data entry people? Will employees succeed in a business where computers do not suffice? Does the office shut down when the computer has a virus? Can a college graduate determine results that are logically wrong because of a glitch in the software?

Accounting, statistics, and math students should be able to solve a problem with pencil and paper; and they should be able to explain the method for solving problems, evaluating alternatives, arriving at conclusions, and making decisions. Many students can do this "critical thinking" process with the assistance of a computer or even a calculator, but not with only a "pencil and paper." They do not understand the concept and/or the theory behind the solution. Ideally, students will be exposed to business classes that have a balance of teaching fundamentals the "old-fashioned way" and of using technology to teach the software necessary to stay abreast of business functions.

Technology is a tool and should be used as a tool; it is not a panacea for decision-making and everything else that needs to be accomplished in the business setting. Future accountants must be prepared for a changing job market that requires adaptable styles of lifelong learning. If professors want to do their students justice, they should begin with the "paper and pencil" method to find the solution. Once the

student has had the basic fundamentals of each class, he or she should be able to think critically about the problem and arrive at a conclusion. After the student has struggled through finding a solution manually, then the professor can demonstrate the technology that will solve the problem. Students develop an appreciation for both their own fundamental knowledge as well as the technology that is available to help them be more productive. Students even comment that the best way they learn the fundamentals in their accounting classes, is to do the mundane tasks of posting accounts in a general ledger at the beginning of the semester for a few weeks. Then later in the semester, they see how quickly they can use software for efficiency instead of having to write everything out. Ultimately, students understand where the accounts came from and why the financial statements look the way they do. Technology is a wonderful teaching tool, but first students must be able to know the fundamentals to find the answers themselves.

References

Baker, C. M., Shi, Y., & Stock, M. (2006, Spring). Experiences in using technology: A comparative study between traditional and alternative teacher certification students in business teacher education. *Online Journal for Workforce Education and Development, 1*(4), 1-17. Retrieved February 10, 2011, from http://opensiuc.lib.siu.edu/ojwed/vol1/iss4/.

Bartholomew, K. W. (2004, October). Computer literacy: Is the emperor still exposed after all these years? *Journal of Computing Sciences in Colleges, 20*(1), 323-331.

Baugh, J., Davis, G., Kovacs, P., Scarpino, J., & Wood, D. (2010). Employers and educators want information systems graduates to be able to communicate. *Issues in Information Systems, (10)*1, 198-207.

Bellamy, J. S., & Mativo, J. M. (2010). A different angle for teaching math. *Technology Teacher, 69*(7), 26-28.

Brody, R. G., & Coulter, J. M. (2002). Preparing business school graduates for the 21st century workplace. *College Student Journal, 36*(2), 222-227.
Ehrmann, S. (2004, Fall). Beyond computer literacy: Implications of technology for the content of a college education. Association of American Colleges & Universities. Retrieved, August 15, 2010, from http://www.aacu.org/liberaleducation/le-fa04/le-fa04feature1.cfm.

Leiber, N. (2010, June 21). For small business, the big decision is hiring. *Bloomberg BusinessWeek*, 4184, 13-14.

McFadden, K.L., & Gabric, D. (2001). Student and employer perceptions of desirable entry-level operations management skills**.** *Mid-American Journal of Business, (16),* 50-59.

Nimwegen, C. V. (2008). The paradox of the guided user: Assistance can be counter-effective. Retrieved February 16, 2011, from http://igitur-archive.library.uu.nl/dissertations/2008-0401-200600/UUindex.html.

Pescovitz, D. (2008, October 6). Paper and pencil better for the brain than software? Retrieved February 16, 2011, from http://boingboing.net/2008/10/06/paper-and-pencil-bet.html.

Shepherd, I. H. (1998). Work experience: Who needs it? *Journal of Geography in Higher Education, 22*(1), 135-145. Retrieved from Academic Search Premier, February 14, 2011.

Stevens, B. (2005, March 1). What communication skills do employers want? Silicon Valley recruiters respond, *Journal of Employment Counseling.* Retrieved February 14, 2011, from http://www.allbusiness.com/sector-56-administrative-support/administrative/1189004-1.html.

Tanyel, F., Mitchell, M., & McAlum, H. (1999, September/October). The skill set for success of new business school graduates: Do prospective employers and university faculty agree? *Journal of Education for Business*, *75*(1), 33-37.

Wyer, J. C. (1993). Accounting education: Change where you might least expect it. In *Learning from Change: Landmarks in teaching and learning in higher education from Change Magazine: 1969-1999*, Deborah DeZure (ed.), 275-279. Stylus Publishing, LLC.

A COMPARATIVE STUDY OF MIS PROGRAMS AT AACSB PEER AND ASPIRANT INSTITUTIONS

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Introduction

Innovation in computer technology and systems often drive change in the software, hardware, policies, and procedures in IT departments in business, industry and government. However, the changes in an MIS curriculum in colleges and universities come more slowly and can easily stagnate.

There are several ways to evaluate an MIS curriculum to avoid stagnation. Obtaining feedback from recent graduates, employers, and members of advisory committees can help determine if the curriculum is relevant to the employers in a geographic area.

AACSB accredited business colleges are encouraged to maintain a process of continuous improvement. They are also encouraged to identify competitive peer, comparative peer, and aspirant regional institutions that can be used as a point of comparison in evaluating academic programs.

The faculty in the MIS department in the College of Business at the University of Central Arkansas (UCA) decided in the fall of 2010 to conduct a review of the MIS curriculum. One aspect of the curriculum review was to gather data from the competitive peer, comparative peer, and aspirant groups of institutions.

Purpose of This Study

To conduct a comparative study of the MIS curriculum in the College of Business at the University of Central Arkansas, an AACSB accredited university, with MIS programs at competitive peer, comparative peer, and aspirant institutions.

Research Design

MIS course offerings and degree plans were collected for the AACSB accredited institutions which have been identified by the College of Business at the University of Central Arkansas as competitive peer, comparative peer, and aspirant institutions.

A comparison was made between the current MIS degree plans and course requirements at UCA and the MIS programs at institutions in each group that offers an MIS degree. Data Tables 1-3 show every cause that was identified as being offered at any of the institutions and to whether they are required (noted by an "R") or elective (noted by an "E") courses.

Competitive Peer Group
Three institutions were identified as competitive peer institutions:

- University of Arkansas at Little Rock (UALR)
- Arkansas. State University (ASU)
- University of Arkansas – Fayetteville (UA-F)

Table 1 shows a comparison of the required and elective courses in the MIS program at UCA and the competitive group.

Peer Group
Six institutions were identified as comparative peer institutions:

- Eastern Kentucky University (EKU)
- University of Tennessee at Martin (UT-M)
- Lamar University (Texas) (LU)
- Northern Kentucky University (NKU)
- Sam Houston State University (Texas) (SHSU)
- University of Central Missouri (UCM)

Table 2 shows a comparison of the required and elective courses in the MIS program at UCA and the competitive peer group.

Aspirant Group
Three institutions that were identified as aspirant institutions include the following universities:

- Appalachian State University (App-SU)
- Missouri State University (MSU)
- University of Louisiana at Lafayette (UL-L)

Table 3 shows a comparison of the required and elective courses in the MIS program at UCA and the aspirant group.

Limitations of Study

Several limitations were identified during this comparative study. No distinction was made in the data tables as to whether the required courses are offered in the foundation, core, or major; therefore, the data in the "number of credits" column can be misleading since courses offered outside the major would not be counted as "hours in the major".

No distinction was made as to whether a department offers tracks or an emphasis in an area. Also, no data was gathered as to the level (Freshman, Sophomore, etc.) of the courses.

The data was collected from information and the check sheets that were posted on each university's website. Curriculum changes occur on a regular basis, yet no data was collected concerning the date of the last change or changes that may be under consideration.

Findings

An analysis of the data collected during this study is shown below. The analysis is divided into three groups based on whether the institution was in the competitive peer, comparative peer, or aspirant group.

Competitive Peer Group

Table 1 shows the required and elective courses for each institution in the competitive peer group. A statement is made concerning each finding and a comparison is made between UCA and other institutions in the group.

- The MIS program at UCA offers five elective courses as compared to three at ASU and one at UA-F and UALR.
- UCA is the only program that offers Intro to Architecture as a required course.
- UCA is the only school that does not offer a project management course.
- UA-F is the only institution that does not offer COBOL.
- UCA is the only school that offers an advanced database course.
- UCA is on the low end of the number of required courses in the major. UCA requires only 6 courses as compared to UALR which required 11 courses and ASU and UA-F which require 7 courses.

Comparative Peer Group

Table 2 shows the required and elective courses for each institution in the comparative peer group. A statement is made concerning each finding and a comparison is made between UCA and other institutions in the group.

- UCA is the only school in the group that offers Intro to Computer Architecture and COBOL.
- Only 50% of the schools in the group offer a VB programming course. EK, LU, and ECM require the course, but UCA offers it as an elective.
- UCA is one of three schools, including NKU and SHSU that offer advanced database as an elective.
- UCM is the only school that does not offer a web design course, but UCA is the only one that offers it as an elective.
- EKU and NKU are the only two schools that offer security and E-commerce courses.
- UCA is one of two schools that are on the low end of the number of courses that are required in the major. UCA and UT-M requires only 6 courses as compared to SHSU, UCM, and EKU which require 7 required courses and NKU and LU require 8 and 10 courses, respectively.

Aspirant Group

Table 3 shows the required and elective courses for each institution in the aspirant group. A statement is made concerning each finding and a comparison is made between UCA and other institutions in the group.

- One-half (UCA and UCM) of the schools require Intro to Computer Architecture.
- Of the 75% of the schools (UCA, App-SU, UL-L) that offer web design, UCA is the only school that offers it as an elective.
- UCA and App-SU are among the 50% of the schools that offer Java programming and an advanced database course as electives.
- UCA is the only school that offers a COBOL programming course.
- UCA and UL-L are among the 50% of schools that do not offer security or project management courses.
- UCA and UL-L are in the bottom 50% of schools in the number of required courses. App-SU and MSU offer 9 required courses.

Summary and Conclusions

The results of this research study provide information that can help all information systems faculty and administrators to make informed decisions that could lead to improvement in the MIS programs at AACSB accredited universities in the southeastern region.

Conclusions drawn from the findings are discussed as they may affect UCA curriculum changes.

- UCA is in line with the required courses for all three groups.
- UCA is among the bottom for the number of required courses in the major for all three groups, but is among the top for the number of elective courses offered for all three groups. The number of electives allows for greater flexibility in focusing on a concentration.
- COBOL is only offered by three institutions in the competitive group. While a majority of the schools do not offer COBOL, industry standards in central and northeast Arkansas creates a demand for COBOL programmers that UCA intends to continue to address.
- A majority of the schools in each group offer a project management course. The UCA curriculum committee has recommended a new project management course.

References

Competitive Peer Group

University of Arkansas at Little Rock (UALR)
http://ualr.edu/bba/mgis/

Arkansas. State University (ASU)
http://www2.astate.edu/a/business/departments/computer-information-technology/index.dot

University of Arkansas – Fayetteville (UA-F)
http://waltoncollege.uark.edu/isys/802.asp

Peer Group

Eastern Kentucky University (EKU)
http://www.cis.eku.edu/

University of Tennessee at Martin (UT-M)
http://www.utm.edu/departments/cbga/mmci/checksheets/misdeg08_11.xls

Lamar University (Texas) (LU)
http://www.cob.lamar.edu/infosys.asp

Northern Kentucky University (NKU)
http://informatics.nku.edu/bis/undergraduate/index.php

Sam Houston State University (Texas) (SHSU)
http://www.shsu.edu/catalog/mis.html

University of Central Missouri (UCM)
http://ucmo.edu/cis/

Aspirant Group

Appalachian State University (App-SU)
http://www.business.appstate.edu/cis/

Missouri State University (MSU)
http://cis.missouristate.edu/

University of Louisiana at Lafayette (UL-L)
http://moody.louisiana.edu/ISM

Table 1
AACSB Competitive Peer Institutions

Category	University of Central Arkansas	University of Arkansas at Little Rock	Arkansas. State University	University of Arkansas (Fayetteville)
Degree	BBA	BBA	BS	BSBA
# of Credits	24	30	33	27
Courses				
-Intro to MIS	R	R	R	R
-MS Office	R	R	R	R
-Intro to Arch	R			
-Sys Anal & Des	R	R		R
-Database	R	R	R	R
-Tel/Networking	R	R	R	
-Prog – JAVA	E	R		E
-Prog – VB	E		R	R
-Prog – COBOL	E	R	E	
-Prog – Other				
-Web Design/Dev	E		E	
-Project Mgmt		R	R	R
-Adv Database	E			
-Adv MS Office		R		
-Adv Sys A&D		R		
-Mgmt Info Res		R		
-Security		E	E	
-E-Commerce			R	
-ERP				R
-MIS Capstone				
Total Required	**6**	**11**	**7**	**7**
Total Electives	**5**	**1**	**3**	**1**

Table 2
AACSB Comparative Peer Institutions

Category	Univ of Central Arkansas	Eastern Kentucky Univ	Univ of Tennessee Martin	Lamar Univ	Northern Kentucky Univ	Sam Houston State Univ	Univ of Central Missouri
Degree	BBA	BBA	BSBA	BBA	BS	BBA	BSBA
# of Credits	24	27	31	30	24	33	33
Courses							
-Intro to MIS	R	R		R		R	R
-MS Office	R		R	R	R	R	R
-Intro to Arch	R						
-Sys Anal & Des	R	R	R	R	R	R	R
-Database	R	R	R	R	R	R	R
-Tel/Networking	R	R	R	R	R	R	R
-Prog – JAVA	E			R	R	R	R
-Prog – VB	E	R		R			R
-Prog – COBOL	E						
-Prog – Other			R				
-Web Design	E	R	R	R	R	R	
-Project Mgmt		R		R	R		
-Adv Database	E				E	E	
-Adv MS Office							
-Adv Sys A&D					E		
-Mgmt Info Res					E		
-Security		E			E		
-E-Commerce		E			E		
-ERP						E	
-MIS Capstone				R	R		
Total Required	**6**	**7**	**6**	**10**	**8**	**7**	**7**
Total Electives	**5**	**2**	**0**	**0**	**5**	**2**	**0**

Table 3
AACSB Aspirant Institutions

Category	University of Central Arkansas	Appalachian State University	Missouri State University	University of Louisiana at Lafayette
Degree	BBA	BSBA	BS	BSBA
# of Credits	24	27	30	27
Courses				
-Intro to MIS	R	R	R	R
-MS Office	R	R	R	R
-Intro to Arch	R		R	
-Sys Anal & Des	R	R	R	R
-Database	R	R	R	R
-Tel/Networking	R	R	R	
-Prog – JAVA	E		R	
-Prog – VB	E	R		
-Prog - COBOL	E			
-Prog – Other		R		
-Web Design/Dev	E	R		R
-Project Mgmt		R	R	
-Adv Database	E	E		
-Adv MS Office				R
-Adv Sys A&D				
-Mgmt Info Res				
-Security		E	R	
-E-Commerce				
-ERP				
-MIS Capstone				
Total Required	**6**	**9**	**9**	**6**
Total Electives	**5**	**2**	**0**	**0**

Collaborative Learning

Jacob Ogunlade, Strayer University

Abstract

According to Srinivas (2010)"Collaborative learning is a relationship among learners that requires response interdependence (a sense of sink or swim together), individual accountability (each of us has to contribute and learn), interpersonal skills (communication, trust, leadership, decision making, and conflict resolution), face-to-face promotive interaction, and processing (reflecting on how well the team is functioning and how to function even better).Cooperative learning, Sherif and Sherif (1956) states that "people who help each other and who join forces to achieve a common goal will generally grow to feel more postively about each other and will be willing and able to interact constructively when performing a collective task" (Sharan, 1985, p. 255).Collaborative learning develops higher level thinking skills, promotes learners-leader interaction and familiarity, builds self-esteem in learners, and promotes a positive attitude toward the subject matter (Srinivas, 2010).

Introduction

As Schmuck (1985, p. 1) aptly phrases it, "Cooperation is a fundamental concern of educators. The increasing complexity of social conditions locally and worldwide has brought to the forefront the importance of learning to cooperate." Teachers have great impact on learners in the classroom, in the way they conceptualize their instruction, interact with instructional innovations, learn from experience, and reconstruct their assumptions and their practices once they complete a professional development experience. (Brody & Davidson, 1998, cited in Clark & Peterson, 1986; Cuban, 1988; Nespor, 1987; Richardson, et al., 1991; Richardson, 1990, and Tobin, 1987)

Literature Review

This inquiry uses social psychology research on groups in the classroom in which many sociocognitive variables are investigated. In addition, it uses the social psychology of the dynamics of group competitive, and individualistic motives for goal accomplishment postulated by Kurt Lewin and Morton Deutsch. The literature review also uses the team competency theory, the factors which influence team and group effectiveness.

Strategies, Tools and Methods

Srinivas (2010) offers the following four collaborative learning strategies:

1. Think-Pair-Share:
   a. The instructor poses a question, preferably one demanding analysis, evaluation, or synthesis, and gives students about a minute to think through an appropriate response. This "think-time" can be spent writing.
   b. Student(s) then turn to a partner and share their responses.
   c. During the third step, student responses can be shared within a four-person learning team, within a larger group, or with an entire class during a follow-up discussion. The caliber of discussion is enhanced by this technique, and all students have an opportunity to learn by reflection and by verbalization.
2. Three-Step Interview: This strategy uses a common ice-breaker or team-building exercise, which involves sharing information such as hypotheses or reactions to a film or article.
3. Simple Jigsaw: The faculty member divides an assignment or topic into four parts with all students from each learning team volunteering to become "experts" on one of the parts. The expert team then work together to master their fourth part of the material and also to discover the best way to help others learn it.
4. Numbered Head Together: Members of learning teams, usually composed of four individuals, count off in 1, 2, 3, and 4. the instructor poses a question, usually factual in nature, but requiring some higher order thinking skills. Students discuss the question, making certain that every group member knows the agreed-upon answer.

The Factors Influencing Collaborative Learning

Computer Competency, technology, and instructor characteristics are highly associated with effectiveness of collaborative learning.

Methodology

Qualitative approach-define collaborative learning, describes its key elements, summarizes current research findings, and proposes how best to apply the beliefs and the principles underlying collaborative learning.

I. The Language of Perception Method
Grice (1965, p. 450) proposes a general principle governing the use of language:

One should not make a weaker statement rather than a stronger one unless there is a good reason for so doing. For example, one should not assume that P is stronger than P or Q because P entails P or Q and not conversely. An obvious reason for not making a statement is lack of justification, warrant, or adequate evidence. The explanation for the implication of the assertion P or Q is as follows:

1. S asserted Ψ or χ
2. S did not assert the logically stronger Ψ or assert the logically stronger χ
3. A good reason for not asserting a statement ϕ is not having adequate grounds for asserting ϕ.
4. So the speaker, it is presumed, does not have adequate grounds for asserting Ψ and does not have adequate grounds for asserting χ.
5. If so, then the speaker does not know Ψ, and the speaker does not know χ.
6. So the speaker means to imply in asserting Ψ or χ that the speaker does not know that Ψ and does not know that χ.

Grice assumed in this form of argument that a speaker is capable of having and of recognizing good reasons for the action of making a statement--actually, in this case, an inaction: not making the statement Ψ is the same as what the speaker means to imply in performing the alternative action by asserting the disjunctive sentence Ψ or χ. (Atlas, 2005, pp. 52-53)

II. Conversational Inference Method
Properties of conversational inference that support collaborative learning include the following:

1. Inductive Nature of Conversational Inference
   a. Conversation inference is itself a form of judgment under uncertainty. Hearers have to make hypotheses about the speaker's intended meaning on the basis of what is explicitly said.
   b. Conversational inference shares some important properties with inductive. First it is ampliative, that is, the conclusion contains more information than the premises. Second it is defeasible, that is, it can be canceled by the addition of new information.
   c. Conversational inference is unlike deductive inference, where conclusions contain no new information, but simply demonstrate what can be inferred from the premises, and cannot be canceled by the addition of new information.
   d. Conversational inference is an inductive inference, that is, one from which correct conclusions can never be drawn with certainty. (Adler & Rips, 2008, p. 776)

III. Theory of perception/ Language of perception, and Interpretations of probability Method
In many formal applications of the language of perception, such language uses the applications of probability theory, but has some drawbacks. The following constitutes the interpretation of probability:

1. In many problems, including business decisions, the probability that some specific outcome of process will be obtained can be interpreted to reflect the relative frequency with which that outcome would be obtained if the process were repeated a large number of times under similar conditions. (Scheaffer, Mulekar, & McClave, 2011)
2. The language of perception is like interpretation of probability that is based on the concept of equally likely outcomes. It is the concept of risk, a situation in which the future state or outcome of the situation is not known for certain. Expected return is the anticipated profit, averaged over a suitable range of scenarios. (DeGroot, 1986, Berk, DeMarzo, & Harford, 2010)
3. The language of perception is also like the interpretation of probability that a person assigns to a possible outcome of some process that represents his own judgment of the likelihood that the outcome will be obtained. This judgment will be based on that person's beliefs and information about the process. (DeGroot, 1986, p. 4)

Advantages of Collaborative Learning

1. Research (Nance, 2000) shows collaborative and interactive learning environments such as cooperative discussion boards are best for

student learning. Cooperative discussion boards allow students to review others 'comments, add their own comments, or start a new line of discussion. They also assist students' adjustments to new settings.

2. In a collaborative learning environment, users can easily access the people, information, and online technology they need to implement learning efficiency solutions in a timely and efficient manner.
3. Collaborative learning ensures that everyone involved with a project stays on the same page. It provides complete transparency to project critical path requirements and task assignments, plus 24/7/365 member contact.
4. Pearson Learning Studio is a comprehensive, flexible, and fully supportive environment for personalized online learning in higher education. It ensures that faculty and administrators have the integrated platform, tools, content and support they need to create, manage and measure successful online learning experiences. (Pearson, 2011)
5. Pearson Learning Studio helps to maximize student achievement through personalized learning and assessment.
6. Pearson Learning Studio provides each student with a personalized learning path.
7. Oracle Enterprises adhere to compliance and government regulations such as Health Insurance Portability and Accountability Act, the Sarbanes-Oxley Act, Office of Management and Budget Circular A- 123, and International Organization for Standardization 9001. (Oracle, 2010)
8. Microsoft Learning Gateway enables teachers to raise standards by allowing teachers to spend less time on paperwork and more time on teaching. (Microsoft, 2004)

Collaborative learning promotes interaction, achieves a common goal that generally allows students to feel more postively about each other and be able to willingly interact constructively when performing a collective task. Collaborative learning develops higher level thinking skills, promotes learners-leader interaction and familiarity, builds self-esteem in learners, and promotes a positive attitude toward the subject matter. In a collaborative learning environment, users can easily access the people, information, and online technology they need to implement learning solutions in a timely and efficient manner. Collaborative learning helps to maximize student achievement through personalized learning and assessment while adhering to compliance and government regulations.

References

Brody, C. M., & Davidson, N. (1998). *Professional development for cooperative learning: Issues and approaches.* Albany: State University of New York Press.

Microsoft. (2004). *Microsoft Learning Gateway: Microsoft Corporation*. Retrieved February 16, 2011, from Microsoft Corporation Web site: http://www.microsoft.com/middleeast/education/microsoftLearningGateway.mspx

Oracle. (2010, June). *The Benifits of a Unified Enterprise Content Management Platform: Oracle Corporation*. Retrieved February 16, 2011, from Oracle Corporation Web site: http://www.oracle.com/us/products/middleware/content-management/059406.pdf

Pearson. (2011). *Learning Studio: Pearson Learning Solution*. Retrieved February 16, 2011, from Pearson Learning Solution Web Site: http://www.pearsoncustom.com/pearson-learning-studio.

Scheaffer, R. L., Mulekar, M., & McClave, J. T. (2011). *Probability and statistics for engineers.* Florence, KY: Cengage Learning, Inc.

Schmuck, R. (1985). Learning to cooperate, cooperating to learn: Basic concept. In R. E. Slavin, *Learning to cooperate, cooperating to learn* (pp. 1-3). New York: Plenum Press.

Sharan, S. (1985). Cooperative learning and the multiethnic classroom. In R. E. Slavin, *Learning to cooperate, cooperating to learn* (p. 255). New York, NY: Plenum Press.

Sherif, M., & Sherif, C. (1956). *An outline of social psychology.* New York: Harper & Brothers.

Srinivas, H. (2010, August 17). *Collaborative Learning: The Global Development Research Center.* Retrieved September 17, 2010, from GDRC Web site: http://www.gdrc.org/kmgmt/c-learn/index.html

NOTES

A Comparison of Learning Style Models, Cluster Analysis and eLearning Performance: An Empirical Study

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Abstract

This study investigates the relationships between learning styles and eLearners' performance, particularly to research – how to categorize learning styles using an inventory of learning style models and instruments, and how do learning styles impact the eLearner's performance. In an attempt to study primarily the relationships, correlation studies were carried out between learning styles and combinations of learning styles of the participants and eLearning website features preference. The results of this study indicated that largely there were weak significant correlations between the learning styles and eLearning performance. Positive correlations suggesting that a caution should be exercised by the eLearning designers and instructional designer in formulating course materials using eLearning students' learning styles as a consideration.

The association of learning style and its clusters, and eLearning performance were examined in this study. Thinkers were the dominant group among all four clusters. The results indicated that at least two clusters (Knowledge Cultivator and Knowledge Seeker) have similar characteristics with small difference in the Pragmatist score. Kruskal-Wallis Test was conducted to compare the ranked mean scores on Clusters and eLearning website feature preferences. The results also showed that there is a difference in eLearning performance - among respondents in four Clusters – Knowledge Seeker, Thinker, Knowledge cultivator and Campaigner. As per this research study, it could be suggested that learning styles or clusters of learning styles do have significant association with the eLearning. Since this is one of the few studies that have been conducted in this area, the results are not strong enough to offer generalizability and more number of studies need to be carried out.

Key words: *Learning Styles, Cluster Analysis, eLearning Performance*

Introduction

Availability of communication technologies has generated growing interest in the use of distance education methods to reach larger student populations. Online courses provide opportunities for individuals who would otherwise not have opportunities for learning (Deal, 2002) and enrolment in online courses continues to grow (Sloan-C, 2009). Administrators in higher education have asked many faculties to offer their traditional face-to-face courses in online formats in order to respond to the current demand from students. Many faculties have converted their face-to-face courses to accommodate administrators' requests, yet have given little attention to the nature of this new delivery environment or eLearners' style of learning. Not surprisingly, delivering course syllabus, reading and PowerPoint developed for traditional face-to-face courses through online course management system or eLearning website system is not adequate to ensure sound online courses. Improvement in current practices of online courses is unlikely to happen before our knowledge about how to match more effective, efficient and appealing eLearning website environment with the eLearners' style of learning. Implementation of online courses should be achieved through careful analysis of eLearning environment and analysis of online students' characteristics (Singleton, et al., 2004; Young, 2006).

Educators can utilize learning style inventories to understand their students' learning tendencies and can design educational activities and material that responds directly to the students' learning preferences in an eLearning environment. The results of learning style inventories can be used to select specific course content that match with the eLearners' learning styles. However, the effects of providing instructions that use matching of learning styles of adult students in online courses have not been addressed sufficiently to guide the online course designers. Understanding this relationship is important to guide the online course design practice.

Purpose of this Research

The primary purpose of this research is to investigate the relationship between perceived learning styles of the eLearners and their performance in eLearning environment. The secondary purposes is to study various models of learning styles for examining learning styles and research various patterns of learning styles and their characteristics as clusters.

Research Questions

This study is designed to address a broad research question:

What impact (if any) does an eLearner's learning style have on their performance for in an eLearning system?

To answer this broad research question two specific research questions were investigated:

Research Question 1: How can an eLearner's learning style be meaningfully categorized?

Research Question 2: How do learning styles or clusters of learning styles impact the eLearner's performance in an eLearning system?

The Research Question 2 is the most extensive one, and is not examined by a literature review alone like Research Question 1, but rather through a full-fledged empirical cycle. This cycle involves setting up research hypotheses and conducting a survey.

Significance

Learning styles provide valuable information to understand individual difference about how individuals perceive, think, learn and solve problems (Pheiffer et al., 2003). Being able to identify impact of learning styles of students on their eLearning performance will provide a basis on which guidelines and models can be designed to provide instructors and instructional or eLearning designers with verified approaches that respond to the individual student's learning styles. Therefore, it would be useful to investigate and develop knowledge about the association between learning styles and eLearning performance, and how learning style can be utilized to select and assist eLearners to enhance their performance. If these associations are significant, instructional designers can utilize the results of this study to modify existing eLearning courses to meet the needs of eLearners with different learning styles or to design eLearning courses that match learning styles of eLearners.

A Comparative Review of Learning Style Models

Evaluation of 8 prominent models has been conducted, looking both at studies where researchers have evaluated the underlying theory of a model and empirical studies of reliability, validity and pedagogical impact. To ensure consistency in each of these analyses, the following aspects of models were used - description and scope of the model, measurement description of instrument, reliability and validity and implications for pedagogy (see Appendix 1).

Following models and instruments were studied in details: Gregorc's Mind Styles Model and Style Delineator (GSD), Dunn and Dunn model and instruments of learning styles, Riding's Cognitive Styles Analysis (CSA), Myers-Briggs Type Indicator (MBTI), Jackson's Learning Styles Profiler (LSP), Kolb's Learning Style Inventory (LSI), Honey and Mumford's Learning Styles Questionnaire (LSQ) and Herrmann's Brain Dominance Instrument (HBDI).

Gregorc's Mind Styles Model and Style Delineator

Gregorc (1982b) identifies two dimensions of learning styles – perception and ordering. Perception is defined by Gregorc as 'grasp of information' on a continuum between 'abstract and concrete', and 'ordering' as the way information is 'arranged', 'systematized' or 'referenced' on a continuum from 'random to sequential'. Kolb (2005) has used similar dimensions – 'prehension' and 'transformation'. Gregorc's 'sequential processing' and 'random processing' also resembles Guildford's (1980) 'convergent thinking' and 'divergent thinking'. Because of the lack of support in terms of reliability and validity of GSD, and basis of identifying learning styles not being embedded in theory, it is not considered a strong candidate for studying learning style of eLearners for the undertaken investigation. However, literature does provide some support to the group difference as it relates to the 'sequential' and 'random' constructs.

Dunn and Dunn Model and Instruments of Learning Styles

Dunn and Dunn model has become popular amongst elementary schools in the US since 1960s. It is being used in teacher training courses, and by individual practitioners (Dunn 2003a). Reese (2002) states that Dunn and Dunn model has attracted financial support from the US government for implementing the use of the model in the school districts. Klein et al. (2003a and 2003b) have given a call for further research investigations into the usefulness of the model before allocating resources for use of this model by the school districts to enhance the retention and achievement of students.

The literature review of the Dunn and Dunn suggests that if there is a match between learning styles and the instructional environment, any student's learning can be positively influenced. Thus, how to teach

students whose learning styles are not known to the teacher is a critical question to investigate. This model provides some pointers toward that view.

Riding's Model and Cognitive Styles Analysis (CSA)

Cognitive style is defined as the manner of an individual's thinking and preferred way of organizing and structuring information (Riding and Rayner, 1998). They introduce another term learning strategy, which is defined by them as processes used by the learners to engage in learning activities. The distinction between the two is made by Riding (2002) in that the learning strategy is dynamic and can be changed and developed, whereas learning styles remain static and integral part of an individual. The grouping of models by Riding and Rayner (1998) is based on a number of themes like learning through experience, preference of modes of instructions and the development of cognitive skills and processes used by learners in learning activities. Thus, their model does not provide a diagnosis of different learning styles, but focuses on development of cognitive styles, learning through experience and social behavior.

Riding and Rayner (1998) describe their model to be two dimensional. The first dimension consists of the cognitive organization, and the second one refers to the mental representation. The mental representation dimension is designed to measure how fast an individual can process verbal and visual information. Both of these dimension measurements are focused on speed rather than accuracy.

There are empirical issues with the Riding's model and CSA; however, it may have implications for teaching, in that teaching toward any of the poles described in the model would present limitations for the students. Thus, a teacher should teach in dual mode to address generalities and specifics; structure the teaching material in such as a way that global and specific issues are addressed, use deductive and inductive reasoning and emphasize verbal and visual communications.

Myers-Briggs Type Indicator (MBTI)

In the 1940s, Katherine Briggs and Isabel Briggs-Myers started the design of the instrument, now called as Myers-Briggs Type Indicator (MBTI). They were driven by the idea that Jung's theory of human personality could be made more understandable by making it more useful for our daily lives or everyday lives. As a result, in 1962 the first MBTI manual was published, and revisions have appeared in 1985, 1998. The MBTI has been used frequently as a personality instrument identifying personality factor like agreeableness, conscientiousness, extraversion, neuroticism and openness.

Neuroticism is not included in the MBTI. A variant of MBTI popular instrument in the UK and US is called NEO-Personality (McCrae and Costa, 1987).

MBTI has attained colossal success; however, it has not acquired support as an instrument for the measurement of style nor as a tool to aid pedagogy in the research community. The analytical and empirical research work carried out to test the instrument has not been sufficiently critical in terms of suitability, strength and weakness, and the research work, probably, is driven commercial pressures. There is a lack of research about the stable types over life time of an individual, unclear knowledge of types' impact on education and not well researched practical applications of MBTI type in pedagogy, the usefulness of MBTI as a learning style instrument is questionable.

Jackson's Learning Styles Profiler (LSP)

Jackson (2002) drawing on the personality theory and the psychobiological theories developed learning style profiles (LSP) instrument for business and education.

A large number of research papers have not been publishes since the first publication of the LSP by Jackson. It is still relative a new instrument, thus research is still not available on subjects relating to the reliability or validity. The use of LSP, pedagogical and development aspects need to be researched.

Kolb's Learning Style Inventory (LSI)

David Kolb (1984) described learning theory and LSI in his book –'Experiential learning: experience as the source of learning and development.' This book provides an extensive coverage to his learning theory and its use in various fields, and how LSI measures individual learning. Kolb's work on experiential theory has been extensively used in various fields like accounting, computer studies, education, law, management, medicine, nursing psychology and medicine (Kolb, 2000; Mainemelis and Kolb, 2002). Kolb (1999) argued that understanding different learning styles would be useful in team work environment in conflict resolution and better communication. Kolb's LSI instrument has been translated into few languages.

The evidence relating to the experiential learning and learning style inventory has been presented by Kolb

et al. (2002). They have based their analysis on two main research works by Hickox and Iliff. Hickox (1991) reported that experiential learning theory received support by 61.7 percent, mixed support by 16.1 percent and no support by 22.2 percent. Iliff (1994) evaluated 101 studies found that 48.5 percent supported LSI, 39.6 percent demonstrated mixed support and the rest did not support the LSI. Iliff has argued that LSI's purpose is to be used as self-assessment exercise. Loo (1999) recognizes the limitations in LSI and supports the effectiveness of LSI as a tool. In the past seven years, Kolb and his team have reported two more instruments: Adaptive Style Inventory (ASI) and Learning Skills Profile (LSP). The ASI measures flexibility in learning styles and the LSP assesses skill development to cope with different learning circumstances (Kolb et al., 2002).

Garner (2000) found that Kolb's works have theoretical incongruity based on flexible learning styles to become stable. He is not convinced about the influence of environment on learning styles and finds Kolb's work to entail deeper theoretical contradiction – "how it can be described or measured?"

According Kolb and Kolb (2005) learning is most effective when learners go through the four stages of learning cycle. Learning could begin at any stage of the four stage learning cycle. However, researchers adopting the learning cycle insist that it should be undertaken in a sequence.

Honey and Mumford's Learning Styles Questionnaire (LSQ)

Peter Honey and Alan Mumford (1982) proposed Learning Style Questionnaire after using Kolb's LSI instrument for number of years to study managerial learning. Since the LSI had face validity issues, Alan and Mumford started exploring various approaches to examine differences in learning preferences. The LSQ was an outcome of these studies. Unlike in Kolb's LSI asking learners to describe how they learn, Honey and Mumford explored general tendencies instead of learning. The LSQ has continued to evolve since 1982 with the research contributions of Peter Honey. He has written various versions of the manuals and booklets (Honey, 2006)

According to Honey and Mumford (2000), there are two main uses of LSQ: 1. it assists in developing plans for personal development; 2. it demonstrates different learning styles to the managers for helping staff under them by selecting activities that would conform to the preferred learning styles of the staff. They also claim that the managers, who facilitate staff learning, will likely encourage staff according to their own preferred learning styles. The LSQ lacks empirical evidence of pedagogical impact.

Herrmann 'Whole Brain' Model and the Herrmann Brain Dominance Instrument (HBDI)

Herrmann's whole brain model is based on the split brain research by the Nobel Laureate Roger Sperry (1964). Herrmann (1982) identified electroencephalographic correlations of left and right side brain functions. He proposed four categories of preferences or styles and their characteristics based on association with the part of the brain (Herrmann, 1989).

'Theorists (cerebral, left: the rational self) - Theorists are said to find it difficult to accommodate the feeling self and the humanitarian style.

Organizers (limbic, left: the safe-keeping self) - Organizers are said to find it difficult to accommodate the experimental self and the innovatory style.

Humanitarians (limbic, right: the feeling self) - Humanitarians are said to find it difficult to accommodate the rational self and the theoretical style.

Innovators (cerebral, right: the experimental self) - Innovators are said to find it difficult to accommodate the safe-keeping self and the organizing style.'

Herrmann's model described combination of preferences and claimed that 'left brain' quadrant A and B and 'right brain' quadrant C and D are more harmonious than the combinations of D and B or A and C. He reported that conflict may arise in 'diagonal quadrants.'

Herrmann designed instrument called HBDI using 120 items to classify mental preferences or thinking styles. These styles are also called as learning styles. The 'whole brain' model is not based on biological determinism.

Indeed, Herrmann (1989, 20–21) is persuaded that 'the way a person uses the specialized brain results from socialization – parenting, teaching, life experiences, and cultural influences – far more than from genetic inheritance'. He believes that it is in the interest of individuals and organizations to develop sufficient flexibility to respond, against their natural preferences, to meet particular situational demands; and, where necessary, to make longer-lasting value-

based adjustments, especially if this can release latent creativity in an individual or in an organization.

Unlike other models that have categorized learning styles into four categories and two dimensions and provided a simplistic view, Herrmann whole brain model does not label individuals or organizations. He positively encourages change and growth, whether for short-term adaptive purposes or for the longer term, on the basis of more mature values and attitudes.

On the positive side, Herrmann Group has facilitated the model and HBDI with revision based on empirical research. However, the instrument needs improvement with focus of its use by the participants who do not have business or corporate experience and responsibilities, and are younger, less experienced and less educated. Overall Herrmann has provided a creative space for discussions and research in light of other models and instruments of learning styles.

The HBDI does have psychometric properties, but lack support from an independent research study to establish reliability and validity. Like other models and instruments (LSI and LSQ), the potential of HBDI to improve the quality of teaching and learning, has not yet been ascertained by independent empirical research studies. The HBDI does show support from its followers in education as well as in corporate businesses.

Summary of Models for Comparison to Focus on Selection of a Model

Eight models of learning style reflect a spectrum of variability in terms of their scope and therefore, the selection of instrument for further investigation about relationships between learning styles and eLearning performance matters for a detailed and relevant research study. The models and instruments reviewed in Appendix - 1 where strengths and weaknesses in terms of design of the model, reliability, validity, implications of pedagogy and overall assessment have been presented.

Model Selection for Learning Style investigation

Based on the comparison table (Table 1), Honey and Mumford's LSQ instrument was selected to measure learning style of the eLearners. The matrix table reveals that Honey and Mumford's Model is more suitable given the analysis used in this chapter on the basis of design, reliability and validity of the instrument, pedagogical implications, and overall assessment of the model and instrument.

Opportunities for this Research Context

Based on analysis of the models, a comparative matrix provides assistance selection of Honey and Mumford's model for further research in exploring understanding of a framework of relationship between learning styles and eLearners' performance.

The literature review regarding Learning Styles and eLearning performance reveals that there is a limited research that establishes relationship between learning styles of eLearners' performance.

To seek answers to the above mentioned questions in section 1.2, and explore related issues, a framework of research is being proposed to study relationships between learning styles and eLearning performance in an eLearning environment. A research design is proposed based on learning styles and eLearning performance, and to explore opportunities that exist in terms of developing understanding of a framework of relationships between Learning Styles of eLearners and clusters of Learning Styles and eLearning performance.

Research Framework and Design

A diagrammatic representation of the research framework pertaining to the association of learning style and eLearning performance was envisioned. Figure 1 describes the proposed framework, where the four learning styles are associated with eLearning performance of the eLearner. Similarly, in the Figures 2 a framework of relationship is envisioned between four clusters learning styles and eLearning performance of the eLearner.

Three types of data were collected from student respondents electronically using two online platforms – ZARCA Survey platform and Perterhoney's website hosting Learning Style Instrument via www.dba.peterhoney.com. The first types of data were demographic information of participating students and their eLearning performance as represented by cumulative grade point average. The second types of data related to the Learning Styles of participants, and were collected using Alan Mumford and Peter Honey's Learning Style instrument (LSI). Sample for the research study consisted of 441 respondents from a population (US university students) representing a response rate of 7 percent.

The demographic information gathered included gender, academic status, name of the degree program, age group, eLearning experience in terms of number of eLearning classes and types of eLearning – hybrid/blended or online, employment status – part time or full time (Questions 1 to 11).

Honey and Mumford's Learning Style Instrument consisted of forty questions with answer options agree and disagree. For each of the participants learning style, raw and percentile scores were generated by the instrument automatically. The LSI has been in used for the last 25 years by a wide variety of institutions including universities and colleges. It is already a validated instrument. Therefore, no instrument validation was deemed necessary.

Data Analysis

Data analysis was carried out in four parts: descriptive statistics, relevant hypotheses testing using non-parametric statistical tests, Cluster Analysis, and Kruskal-Wallis ANOVA.

The descriptive statistics examine the participant data with regards to the variables- gender, academic status, name of the degree program, age group, eLearning experience in terms of number of eLearning classes and types of eLearning – hybrid/blended or online, employment status – part time or full time.

The hypotheses were tested to find out the impact in terms of the magnitude and direction of the association between learning styles and eLearning performance. The calculation of Spearman Rho correlations involved four learning styles (Activist, Reflector, Theorist and Pragmatist), clusters of learning styles and eLearning performance (GPA).

Hierarchical Cluster analysis was undertaken to identify homogeneous group of cases based on learning styles of the eLearners. Dendrogram using average linkage between groups were analyzed. A single solution consisting of four cluster membership was obtained that included all 441 cases. The average score of four learning styles in each cluster were analyzed and characteristics groups were described. Cross-tabulations of the cluster groups and demographics including age, gender, academic status, eLearning experience, eLearning type and discipline were carried out.

Correlation studies and hypotheses testing have been carried out to study the direction and magnitude of relationship between learning styles and combinations of learning styles. Cluster analysis is performed to investigate how learning styles can be clustered, and if there is a possibility of correlation between clusters and website features. Lastly, Kruskal-Wallis ANOVA of clusters and eLearning performance has been done to examine the difference between clusters and eLearning performance. Four hypotheses were tested to find out if there is no difference in eLearning performance among respondents in four Clusters – Knowledge Seeker, Thinker, Knowledge cultivator and Campaigner.

Results

The statistical findings are presented in this section and the description of the results is organized into three parts. The first part describes statistics relevant to testing the experimental hypotheses relating to correlations. The second part illustrates cluster analysis and reviews relationship between clusters and eLearning Performance. Lastly, the third part deciphers results from Kruskal-Wallis ANOVA and Cross-tabs with the demographic data.

Part I: Correlation: Learning Styles and eLearning Performance.

Spearman's Rho correlations were calculated to find out the magnitude and direction of the association between learning styles and eLearning performance. Four learning styles (Activist, Reflector, Theorist, and Pragmatist) were used to calculate Spearman Rho Correlations (Table 2).

Learning Styles (Activist, Reflector, Theorist and Pragmatist) and eLearning Performance (Overall GPA):

H_0: There is no association between the two variables – the degree to which students perceive themselves to be Activists and their eLearning performance as measured by the Overall GPA.

H_1: There is an association between the two variables in regard to the degree to which students perceive themselves to be Activist, Reflector, Theorist or Pragmatist and eLearning performance.

All four learning style was positively and significantly correlated to the eLearning performance (r = 0.113*, 0.123**, 0.026* and 0.129**) at the 0.01 ** and 0.05* levels or significance. There were no negative and non-significant correlations (Table 2).

Part II: Cluster Analysis

The hierarchical cluster analysis was carried out to identify homogeneous groups of cases based on learning styles of the eLearners. In hierarchical clustering, the algorithm used starts with each case in a separate cluster and iteratively combines until all cases are in one cluster. The prevalent SPSS Ward Method was used for clustering. Cluster membership is assessed by calculating the total sum of squared deviations from the mean of a cluster. The criterion for fusion is that it should produce the smallest possible increase in the error sum of squares. The process continues until all cases are grouped into one large cluster. In a Hierarchical Cluster Analysis each case is associated in a rescaled distance cluster combine. A single solution consisting of four clusters was obtained that included all 441 cases. The Dendrogram provided information about the magnitude of differences between clusters at each step of the process.

Clusters and learning styles
The mean scores of four learning style were computed for each of the four clusters. Table 3 represents mean scores in a four by four table.

Based on the cluster means for the clustering variables (learning styles), the clusters were labeled. Cluster 1, **Knowledge Cultivator:** has high mean score in Reflector, Theorist and Pragmatist. Cluster 2, **Thinker:** has a high mean score in Reflector and moderate score in Pragmatist, and low scores in Activist and Theorist. Cluster 3, **Knowledge Seeker:** has high mean scores in Reflector and Theorist, and low scores in Activist and Pragmatist. Cluster 4, **Campaigner:** has the high mean score in Activist and Pragmatist, and low scores in Reflector and Theorist (Table 4).

Figure 3 shows a graphic profile of the four clusters. Each cluster is represented by a line along with four points on the line representing mean scores of the learning styles.

Figure 4 describes the line chart of the learning style. Each learning style is represented by a line along with four points on the line representing mean scores of the learning styles for a specific cluster.

Overall GPA of all four clusters reveals that eLearners in the Thinker cluster have the highest average, followed by Knowledge Cultivators, Knowledge Seekers and Campaigners (Figure 5). These differences were statistically tested and an analysis is provided in the next section.

Part III: Kruskal-Wallis ANOVA of Clusters and eLearning Performance

A Kruskal-Wallis Test was conducted to compare the ranked mean scores on clusters and eLearning performance. Four clusters were identified as the category variable and nine eLearning features as dependent variable. The ranks are presented in the Table 5. Statistics from the Kruskal-Wallis Test are presented for each of the nine eLearning website features and clusters in the Table 6.

Clusters and Overall GPA
Ho 1. There is no difference in eLearning performance in regard to the learning styles among respondents in four clusters: Knowledge Seeker, Thinker, Knowledge Cultivator, and Campaigner.

The Kruskal-Wallis was used to test differences in mean performance amongst respondents in the Learning Style Clusters (Knowledge Seeker, Thinker, Knowledge Cultivator, and Campaigner) resulting in significance level value 0.001, which is lower than 0.05. Based on this test, the differences amongst clusters with regard to Overall GPA is statistically significant. Therefore, null hypothesis was rejected. The SPSS output is presented in the Table 6. The differences in the Overall GPA of the four clusters are reported via Figure 5.

Descriptive Statistics: Cross-tabs – Clusters: Gender, Academic Status, and Experience
Cross-tab analysis reveals that thinker is the dominant cluster with regards to gender and academic status. However, clusters show different patterns when cross-tab analysis is done with regards to age and experience. The prominent cluster is knowledge seeker in all categories pertaining to age of the eLearner and experience in terms of number of classes taken in the eLearning environment.

Discussions

Learning style researchers (Sims and Sims, 1995; Hickcox, 2006) suggested that education was most effective when diversity of students' learning style preferences is addressed. However, addressing the learning style preferences of students requires information about their learning styles. This study gathered information about students' learning styles involved in eLearning environments - online and hybrid/blended, and their eLearning performance.

Analysis of the Graphic profile of learning style clusters reveals that Knowledge Cultivator had a high mean score in all learning styles except in Activist.

However, Cluster - Thinker has the highest mean rank and showed the highest eLearning performance in terms of Overall GPA.

Similarly, Knowledge Seeker cluster had high scores in Reflector and Theorist, and low score in Activist. The score for Pragmatist was low as well. Knowledge Seeker, therefore, appears to have similar attributes as that of Knowledge Cultivator with lower Pragmatist scores. The mean score attributes for Thinker were high for reflector, moderate for Pragmatist, and low for Activist and Theorist. Therefore, it appears that the Thinker cluster is distinctly different than Knowledge Cultivator and Knowledge Seeker. Campaigner cluster has high mean scores in Activist and Pragmatist, and low mean scores in Reflector and Theorist. Again, the scores attributes of Campaigner are different than the rest of the clusters. There is no prior research to place these clusters in similar groups based on learning style characteristics.

Correlation: Clusters and eLearning Website Feature preference

The direction and magnitude of association between learning style and eLearning performance demonstrated that all were correlations were positive and significant at 0.05 or 0.001 level of significance, but the magnitude of relationship was weak. It could, therefore, be implied that learning styles do not have a strong positive association with the eLearning performance. Due to the lack of any related preceding research in literature, it is not feasible to put this finding in the context of prior research.

Kruskal-Wallis ANOVA of Clusters and eLearning

According to Kruskal-Wallis ANOVA of clusters, there was significant difference in the in eLearning performance (Overall GPA) among respondents in four Clusters – Knowledge Seeker, Thinker, Knowledge cultivator and Campaigner. Wang et al. (2004) have found a significant difference in the academic achievement of different learning styles. Their unique learning style constructs were based on attendance, interaction and involvement, and material-reading in a cyber-university, and not on any of the learning style models or instruments reported in the literature.

In the absence of adequate prior research literature, it is not possible to place the finding about learning styles and eLearning in the context of previous research (Srivastava, 2010). However, a study of clusters may be relevant for further research in terms of a potential alternate theoretical basis to consider issues of learning entailing the learning process or outcome and engagement rather than learning styles only. An understanding of structuring eLearning experiences with focus on quality of eLearning engagement, interaction with the content, instructor, classmates and course interface would expand traditional research interest of learning styles into research opportunities relating to learning style clusters and eLearning engagement issues.

This exploratory study was primarily designed to investigate the relationships between learning styles and eLearning. Conceptually, it was expected that perceived learning styles, and clusters of learning styles of eLearners may exhibit associations with performance of eLearners. Findings of this study, however, did support significant existence of relationships where adult eLearners were taking eLearning classes in hybrid/blended mode. Thus, existence of association largely, between learning styles and eLearning should be carefully taken into account for designing eLearning course materials and an opportunity should be provided to accommodate all eLearners for their learning styles.

Findings and Future Research

The Internet is used enormously for communication and knowledge sharing throughout the world. Courses are being offered on the Internet to provide options in terms of time and space interactions and reach large student populations who seek alternative settings where they can improve their knowledge and skills while studying from distance. This study investigated the relationships between learning styles and eLearners' performance, particularly to research – how to categorize learning styles using an inventory of learning style models and instruments, and how do learning styles impact the eLearner's performance? The results of the study are important to provide suggestions for online and hybrid/blended eLearning designers, instructional designers and instructors.

This research is one of the few studies conducted to provide suggestions for eLearning designers and online instructions designers about eLearning performance based on learning style clusters. The results of this study suggest that there is association between learning styles, clusters of learning styles and eLearning performance. Thus, future research should concentrate on exploring other factors that can be investigated in understanding relationships between learning styles and eLearning performance.

References

Deal, W. F. (2002) Distance Learning: Teaching Technology Online Resources in Technology, *Technology Teacher*, 61 (8) pp. 21-26.

Dunn R (2003) *Epilogue: So What? In R Dunn And S Griggs (Eds.) Synthesis Of The Dunn And Dunn Learning Styles Model Research: Who, What, When, Where And So What – The Dunn And Dunn Learning Styles Model And Its Theoretical Cornerstone*. New York: St Johns University.

Dunn R and Griggs S (2003) *Synthesis Of The Dunn And Dunn Learning Styles Model Research: Who, What, When, Where And So What – The Dunn And Dunn Learning Styles Model and Its Theoretical Cornerstone*, New York: St John's University.
Garner, I. (2000) Problems and inconsistencies with Kolb's learning styles. *Educational Psychology*, 20 (3) pp 341–348.

Gray, J. A. (1973) Causal theories of personality and how to test them. In Royce, J. R. (ed.) *Multivariate Analysis and Psychological Theory*, New York: Academic Press.

Gregorc, A. F. (1982b) *Gregorc Style Delineator: Development, Technical and Administration Manual*, Columbia, CT: Gregorc Associates Inc.

Guilford, J. P. (1980) Cognitive styles: what are they? *Educational and Psychological Measurement*, 40, pp 715–735.
Herrmann N (1989) *The Creative Brain*, North Carolina: Brain Books, The Ned Hermann Group.

Herrmann, N. (1996) *The Whole Brain Business Book*, New York: McGraw-Hill.

Hickcox, L, (2006) A review the inventories—1960s-2000s and the question of their actual uses inside and outside of the classroom. In Sims, R., and Sims, S. (Eds.) *Learning Styles and Learning: A Key to Meeting The Accountability Demands in Education*, Hauppauge, NY: Nova Publishers.

Hickcox, L, (2006) A review the inventories—1960s-2000s and the question of their actual uses inside and outside of the classroom. In Sims, R., and Sims, S. (Eds.) *Learning Styles and Learning: A Key to Meeting The Accountability Demands in Education*, Hauppauge, NY: Nova Publishers.

Hickcox, L. K. (1991) *A Historical Review of Kolbs Formulation of Experiential Learn ing Theory*, Unpublished doctoral dissertation, University of Oregon, Corvallis.

Honey, P. (2001) ELearning: a performance appraisal and some suggestions for improvement, *The Learning Organization*, 8 (5) pp 200-202.

Honey, P. and Mumford, A. (2000) *The Learning Styles Helpers Guide*, Maidenhead: Peter Honey Publications Ltd.

Honey, P. and Mumford, A. (2006) *Learning Style Questionnaire*, Peter Honey Publication, Maidenhead, UK

Iliff, C. H. (1994) *Kolbs Learning Style Inventory: A meta-analysis*, Unpublished Doctoral dissertation, Boston University, Boston, MA.

Jackson, C. (2002) *Manual of the Learning Styles Profiler*. www.psi-press.co.uk (accessed on 10 April 2010).

Klein, C., Swaby, A., Richardson, G. and Leung, C. (2003a) Using a learning style approach to improve learning, achievement and retention in further education, *Launch of the Learning Styles Toolkit*. London: South Bank University.

Klein, C., Swaby, A., Richardson, G. and Leung, C. (2003b) Using A Learning Styles Approach To Improve Learning, Achievement And Retention In Further Education, *Final Project Report*, London: London Language and Literacy Unit/South Bank University.

Kolb, A. Y. and Kolb, D. A. (2005) *The Kolb Learning Style Inventory 3.1: Technical Specifications.* Boston, MA: Hay Resources Direct.

Kolb, A. Y. and Kolb, D. A. (2006) Experiential Learning Theory Bibliography: Recent Research 2005-2006. Department of Organizational Behavior, Weatherhead School of Management, Case Western Reserve University.

Loo, R. (1997) Evaluating change and stability in learning style scores: a methodological concern, *Educational Psychology*, 17(1/2).

McCrae, R. R. and Costa, P. T. (1987) Validation of the Five-Factor Model of Personality across instruments and observers. *Journal of Personality and Social Psychology*, 49, pp 710–721.

Pheiffer, G., Andrew, A. Green, M. and Holley, D. (2003) The Role of Learning in Integrating and Empowering Learning, *Investigating in University Teaching and Learning*, 1(2).

Reese S (2002) Understanding our differences. *Techniques*, January, pp 20–23.

Riding, R. (2002) *School learning and cognitive style*. London: David Fulton.

Riding, R. and Rayner, S. (1998) *Cognitive Styles And Learning Strategies: Understanding Style Differences In Learning Behaviour*, London: David Fulton Publishers Ltd.

Singleton, E. S., Hill, J. R. and Koh, M .H. (2004) Improving Online Learning: Students Perceptions of Useful and Challenging Characteristics. *The Internet and Higher Education,* 7 (1), pp. 5970

Sloan-C (2009) *15th Annual Sloan-C Conference – A Review* http://etcjournal.com/2009/11/06/15th-annual-sloan-c-conference-a-review (Accessed on 10/10/2009)

Sperry R. W. (1964) The great cerebral comissure, *Scientific American,* 210 (1) pp 42–52.

Srivastava, M. (2010) *eLearning via The Internet*, Boston: Pearson Learning Solutions.
Young, S. (2006) Student Views of Effective Online Teaching in Higher Education, *American Journal of Distance Education,* 20 (2) pp 65-77.

Table 1: Comparison of Models of Learning Style and Instruments

Models of learning style	Design	Reliability	Validity	Implications of pedagogy	Overall assessment
Gregorc's GSD	√√	√	√	√√	√
Dunn and Dunn's LSI	√√	√√	√√	√	√√
Riding's CSA	√√	√	√	√	√
Myers-Briggs' MBTI	√√	√	√	√	√
Jackson's LSP	√√	√	√	√	√√
Kolb's LSI	√√	√√	√	√	√√
Honey and Mumford's LSQ	√√√	√√	√√	√√√	√√√
Herrmann's HBDI	√√	√	√	√√	√

Relevance Notations:

√ Weak √√ Moderate √√√ Strong

Table 2: Correlations: Learning Styles and Overall GPA

			Activist	Reflector	Theorist
Spearman's rho	Activist	Correlation Coefficient	1.000	.260**	.421**
		Sig. (2-tailed)	.	.000	.000
	Reflector	Correlation Coefficient	.260**	1.000	.479**
		Sig. (2-tailed)	.000	.	.000
	Theorist	Correlation Coefficient	.421**	.479**	1.000
		Sig. (2-tailed)	.000	.000	.
	Pragmatist	Correlation Coefficient	.141**	.005	.202**
		Sig. (2-tailed)	.003	.921	.000
	Overall GPA	Correlation Coefficient	.113*	.123**	.026
		Sig. (2-tailed)	.018	.010	.587

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2.1: Analysis of Gregorc's Mind Styles Model and Style Delineator (GSD)
***Key Source**: Gregorc 1985*

	Strength	Weakness
General	The GSD is based on two dimensions – perception and ordering.	Styles being inborn abilities cannot be changed overtime.
Design of the model	These dimensions include a continuum of concrete-abstract and sequential-random. Predominance of these dimensions may be in one or two areas of the continuum.	Words in the questionnaire be not clear or familiar to the participant. Normative data is reported, and detailed descriptions of the style characteristics are unvalidated.
Reliability	The author reports high levels of internal consistency and test–retest reliability.	Reliability of GDS is questionable in terms of psychometric properties based on independent studies.
Validity	Correlations are reported to be moderate.	The empirical evidence is absent for construct validity.
Implications	Gregorc's bases usefulness of GSD in pedagogical implications as individual learners prefer a variety of instructional strategy mix.	Gregorc claims that individuals not following natural styles would incur negative harm.
Overall assessment	It is not an instrument based in a learning theory that can be used for assessment of individual learning styles.	

Table 2.2: Dunn and Dunn's model and instruments of learning styles
***Key Source:** Dunn and Griggs 2003*

	Strength	Weakness
General	Model is responsive in terms of various groups of factors such as motivational, social interaction, physiological and environmental.	It presents a simplistic view of the physiological and psychological preferences.
Design of the model	Twenty two factions are rated for high and low preferences by the learners. Teachers adopt specific techniques or make environmental changes based on strong preferences	It is criticised for not being a model for learning. There is no theoretical basis for the design of the model.
Reliability	Strong claims are made by the authors using the LSI.	There is criticism of design and reliability of the LSI.
Validity	Strong claims by the supporting studies.	There are questions about the validity.
Implications for pedagogy	As per the LSI claims, learning preference can be described, and intervention with regards to environment and pedagogy to match learning styles will impact achievement.	The implications are described in a biased and forceful manner. There is a lack interest in exploring options. Generalisation of pedagogy is weak to be adopted.
Evidence of pedagogical impact	The model has created a large international research interest. The empirical studies have reported isolation of individual elements fostered effect evaluation.	Independent evaluation of the instrument is lacking.
Overall assessment	There is a sizable amount of supporting literature about the use and benefits of the model that has been generated over the years, despite the limitations in many studies. An independent examination of the model is still lacking.	

Table 2.3: Riding's Cognitive Styles Analysis (CSA)
Key Source: *Riding and Rayner 1998*

	Strength	Weakness
General	It emphases that strategies for learning can be adopted and help improve learning.	This model assumes that learning styles cannot be changed.
Design of the Model	It presents two dimensions of learning: holistic-analytical and verbal –imagery.	It does not cover aspects of cognitive thinking or learning.
Reliability		There is a lack of empirical research to support the model and the instrument.
Validity	The measure may be more useful for groups rather than individual.	Sample size used in the studies is small for reliability and validity of CSA. Replication studies are absent.
Implication of pedagogy	Cognitive styles have been shown to be linked with preferred instructional approaches.	Recommendations have been made based on this model without adequate empirical evidence.
Overall Assessment	Riding's model is simplistic, and its instrument CSA is unreliable.	

Table 2.4: Myers-Briggs Type Indicator (MBTI)
Key Source: *Myers and McCaulley 1985*

	Strength	**Weakness**
General	It describes analysis of the personality including learning.	MBTI is not designed for diagnosis learning types or styles.
Design of the model	The model uses Jung's theory to formulate 16 personality types on the basis of four bipolar scales.	The description of personality type based on bipolar scale is complex.
Reliability	Reliability coefficients are high for individual pairs of scores relating to each of the scales.	The personality types are less stable.
Validity	MBTI has acceptable face validity.	The Construct validity of opposing pairs is questionable.
Implications for pedagogy	It has been widely used in student counselling by matching 'type' with appropriate field of study.	There is lack of evidence about 'type' and 'processing of information'. Does matching teaching style and learning style influence achievement- is questionable.
Overall assessment	Of 16 elements of personality types what types relate to education is not known as per the MBTI. Thus, it is not a suitable model for studying learning styles.	

Table 2.5: Jackson's Learning Styles Profiler (LSP)
Key Source: *Jackson 2002*

	Strength	**Weakness**
General	The LSP is grounded in a theoretical base with computerized format. It is used in business and education fields.	
Design of the model	It describes four learning styles - Initiator, Analyst, Reasoner and Implementer.	The constructs of the four learning have not been defined clearly.
Reliability	There is evidence of retest reliability to be satisfactory.	The Reasoner scale has poor retest reliability.
Validity	The authors claim factorial validity on the basis of a four-factor solution. Some evidence of concurrent validity is provided by correlations with other measures of personality.	Further refinement of the scale is needed.
Implications for pedagogy	The feedback from computerized questionnaire is extensive and provides recommendations for improvement on the weaker areas and using the stronger area of the learning characteristics.	However, the relevance of the suggestions has not been investigated adequately.
Evidence of pedagogical impact		The contextual value of feedback has not been evaluated
Overall assessment	The model and the LSP have potential for a wider use in education field and organizations.	

Table 3.6: Kolb's Learning Style Inventory (LSI)
Key Source: *Kolb 1999*

	Strength	Weakness
General	Learning styles are flexibly stable. The model and the LSI instrument have evolved over 30 years of research.	Over relatively short period learning style should not change. Some empirical research has demonstrated such change.
Design of the Model	It is based on the experiential theory of learning. With experience there is change in the development of learning styles.	LSI mixes learning cycle (four stages), level and style.
Reliability	Over the years changes have been made for improvement.	Reliability is still under question by the critics.
Validity		LSI has been developed to provide self-assessment. The construct validity is questionable
Implications for pedagogy		The proof of performance improvement upon matching is absent. The findings are contradictory. There is lack of large body of researched evidence is missing to support recommendation for pedagogy.
Overall assessment	A pioneering work on learning style based on experiential learning theory with deficiencies about reliability and validity.	

Table 3.9: Herrmann's Brain Dominance Instrument (HBDI)
Key Source: *Hermann (1989)*

	Strength	Weakness
General	HBDI is based on 20 years of research work and has evolved over the years. Several models describe learning styles, and the whole brain model constructs are compatible with those of other learning style models.	
Design of the model	HBDI is a brain-based on theoretical framework and focuses on growth, development and creativity. HBDI definition of learning styles are not fixed personality traits, but patterns of behavior.	It is a self-reposting instrument, and one could report intentionally a particular profile. HBDI instrument is not easy to understand.
Reliability and Validity	HBDI is widely used in the world and analyses pertaining to the reliability and validity can be done by using very large sample. HBDI does have internal studies for face validity.	The reliability and validity have not been established through independent empirical studies.
Implication of pedagogy	Herrmann provides rich accounts of how people think and learn, valuing diversity and arguing for mutual understanding. Teachers, students, managers and workers may be stimulated to examine and refine their ideas about communication and learning. Herrmann argues that all learners need to develop stylistic flexibility and, where appropriate, extend their range of competence	The pedagogical implications of the 'whole brain' model have not yet been fully explored and tested.
Overall assessment	This model has not been used widely in education and training, despite the potential of its use. It does focus on development of people and organizations.	

Table 3: Mean Scores of Four-Clusters and Learning Styles

	Knowledge Cultivator	Thinker	Knowledge Seeker	Campaigner
Activist	3.77551	5.238095	3.235294	7.666667
Reflector	8.367347	8.047619	8.176471	4.666667
Theorist	9	5.952381	8.529412	5.888889
Pragmatist	8.530612	6.52381	5.588235	8.166667

Table 4: Characteristics of Four-Cluster Solution

	Knowledge Cultivator	Thinker	Knowledge seeker	Campaigner
Activist	Low	Low	Low	High
Reflector	High	High	High	Low
Theorist	High	Low	High	Low
Pragmatist	High	Moderate	Low	High

Relevance notations: High - 7.0 and above
Moderate - 6.9 to 6.01
Low - 6.0 and below

Table 5: Mean Rank: Learning Styles

	Cluster Learning Style	N	Mean Rank
Overall GPA	Knowledge Seeker	139	212.09
	Thinker	145	253.91
	Knowledge Cultivator	64	213.02
	Campaigner	93	188.50
	Total	441	

Table 6: Kruskal Wallis
Test Statistics[a,b]

	Overall GPA
Chi-Square	16.899
df	3
Asymp. Sig.	.001

a. Kruskal Wallis Test

b. Grouping Variable: Cluster Learning Style

Figure 1: Learning Styles and eLearning Performance

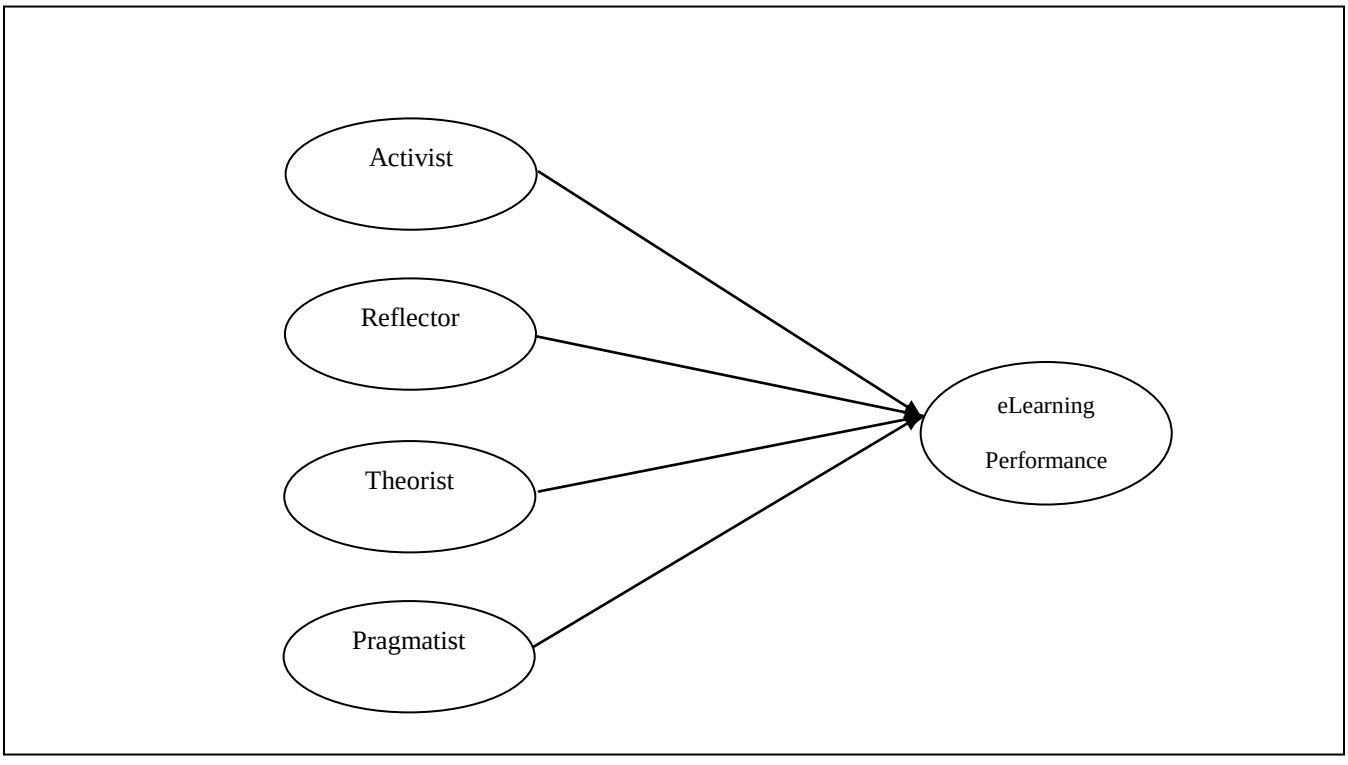


Figure 2: Learning Style Clusters and eLearning Performance

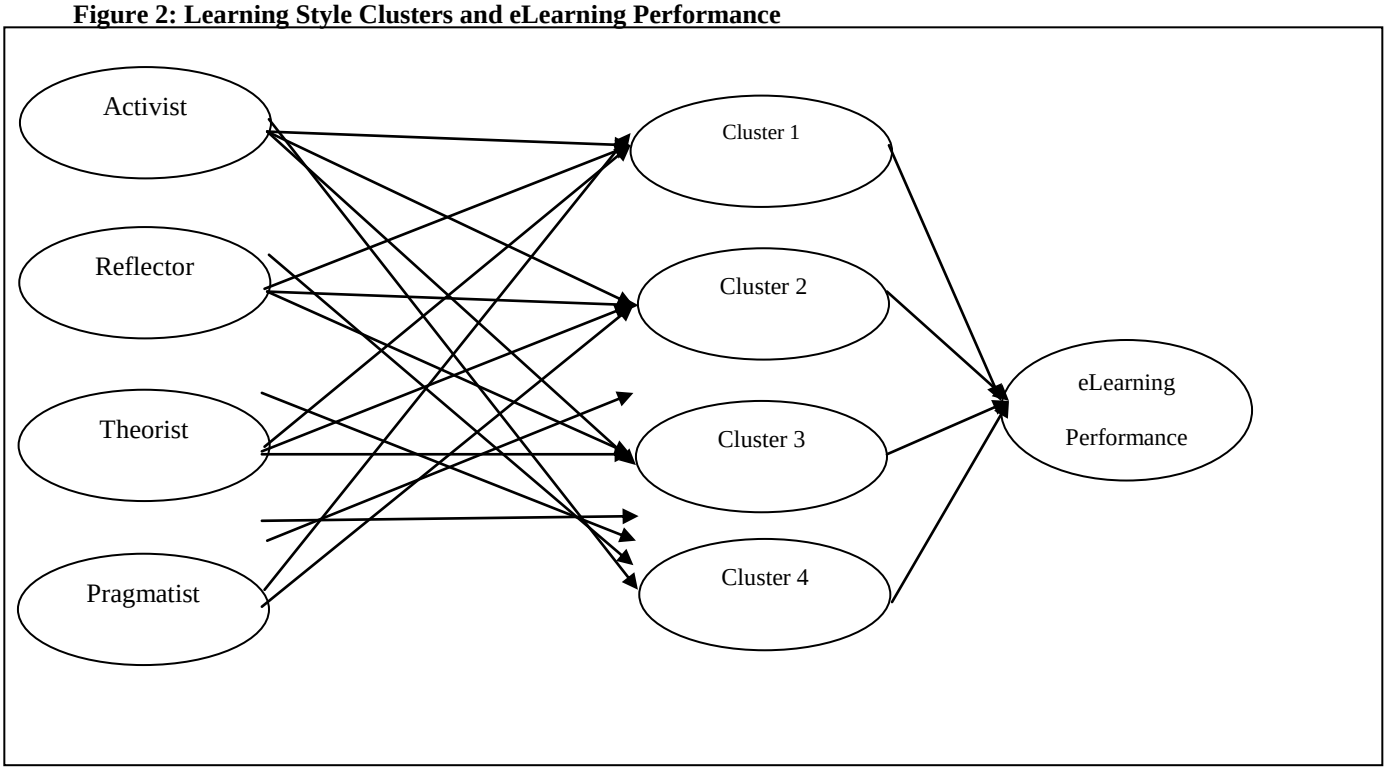


Figure 3: A Graphic Profile of the Four-Cluster Solution using Hierarchical Cluster Method

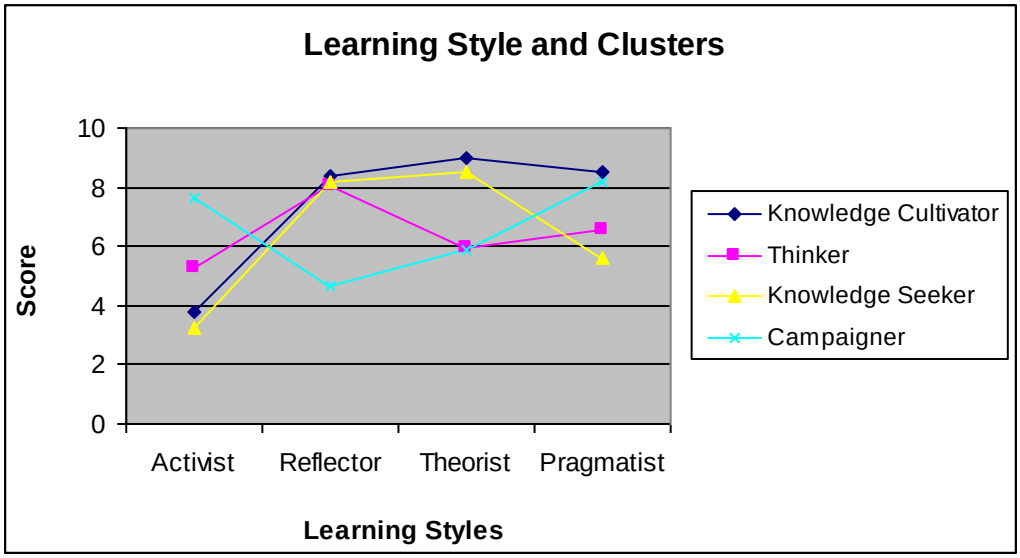


Figure 4: A Graphic Profile of the Four-Clustering variables using Hierarchical Cluster Method

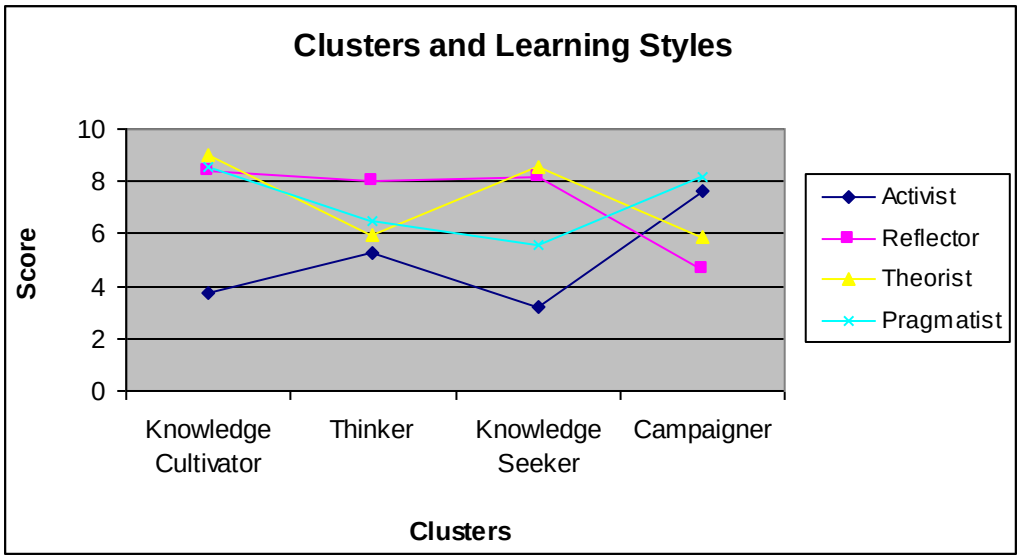


Figure 5: A Graphic Profile of the Four-Clustering variables using Hierarchical Cluster Method

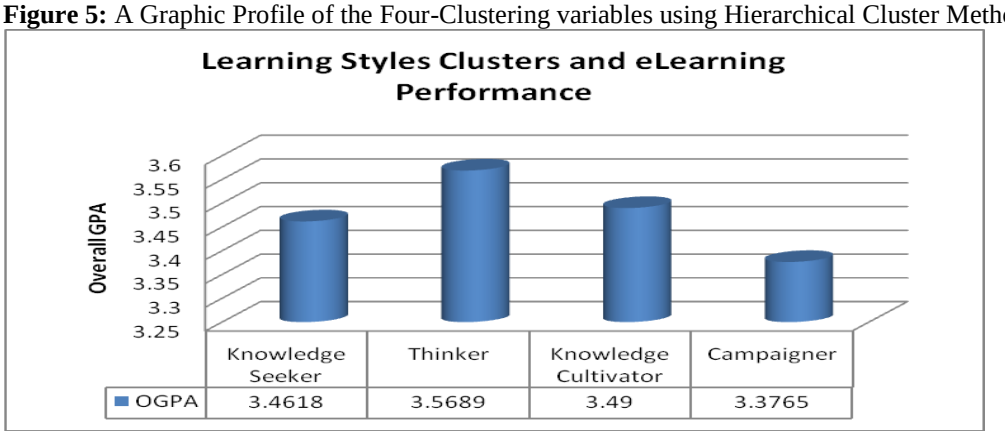
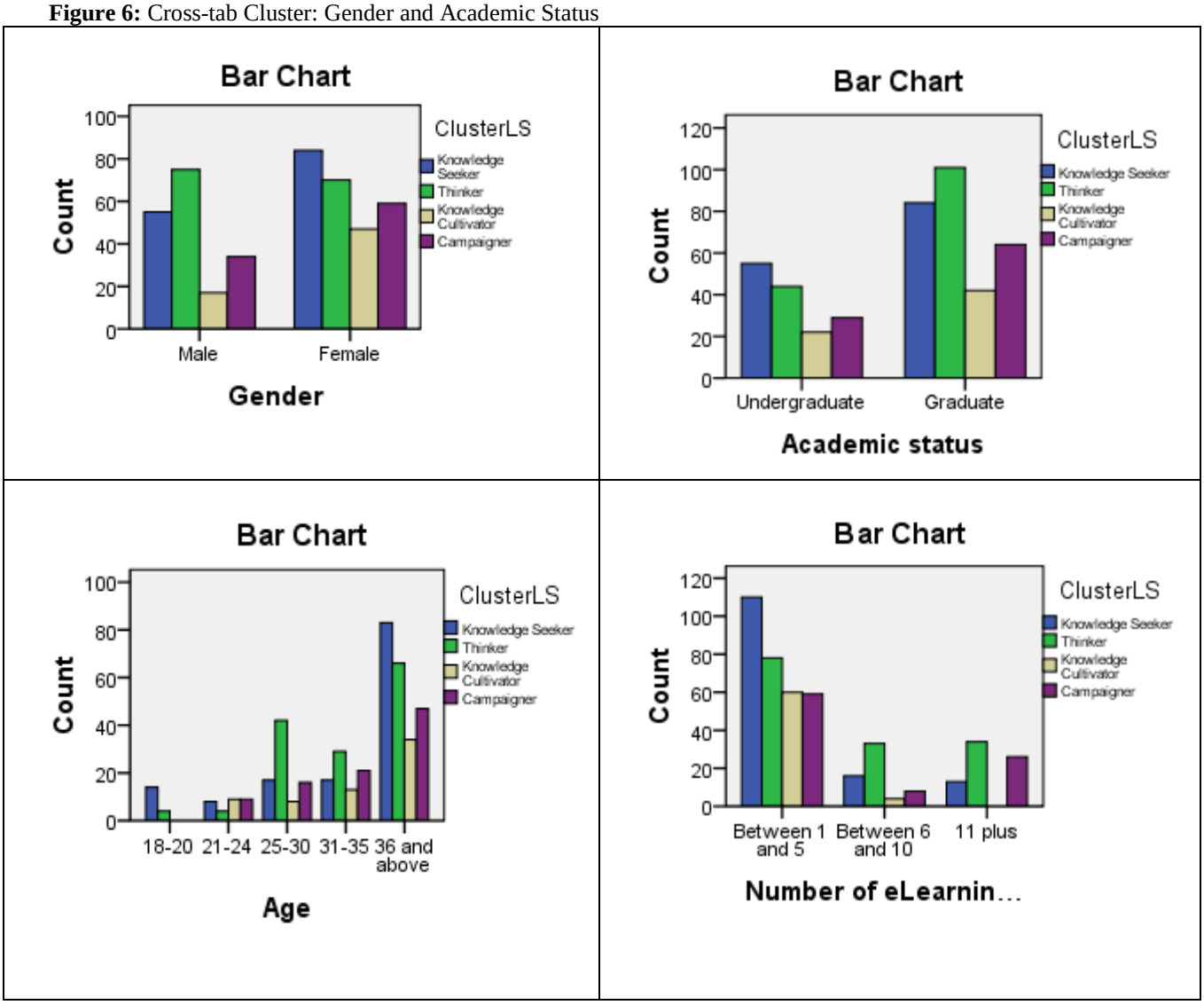


Figure 6: Cross-tab Cluster: Gender and Academic Status



NOTES

Computer Literacy Requirements in Public Universities in the Southwestern Region of the U.S.: A 2010 Review

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Abstract

Over the past three decades, colleges and universities throughout the U.S. have invested much in hardware, software, and faculty resources to ensure graduates leave the institution with technology competencies that qualify the individual as computer literate. This study investigated the current status of computer literacy requirements in public universities in Arkansas, Louisiana, New Mexico, Oklahoma, and Texas to establish a benchmark of current requirements. Findings revealed a split decision as to whether computer literacy is mandated as part of core competencies to be completed in degree programs or whether it is expected of entering students. Also, there is a split approach as to how mandated competencies are achieved; some require credit coursework, some require standardized competency tests, and some may require program-specific competency tests. The majority of colleges of business within the five-state region do include a course focusing on computer literacy and/or competency within their programs.

Introduction

Computer literacy for all college students has been a concern since the early 1980s when personal computers started to emerge for business and personal use, and many schools responded by adding computer literacy requirements to the general education portion of all degrees awarded from the institution. Institutions provided this new literacy, recognizing that the curricula needed to prepare students for their future professional environments. Providing this new literacy required developing specific courses concentrating on computer literacy elements/content. With the large percentage of millennial students now enrolling in universities, coupled with the pervasive use of computers by people of all ages for many daily activities, what is the current status of computer literacy in general education degree requirements? Do schools continue to require completion of specific courses for credit or passage of competency exams? Do schools continue to invest in allocating faculty teaching resources to a computer literacy course?

Defining Computer Literacy

Many variations of a definition for computer literacy can be found by searching textbooks and the Internet. For example, BusinessDictionary.com (2011) defines computer literacy as "level of familiarity with the basic hardware and software (and now Internet) concepts that allows one to use personal computers for data entry, word processing, spreadsheets, and electronic communications."

Other definitions will take computer literacy a step further. The *PC Magazine Encyclopedia* (2011) defines computer literacy as "understanding computers and related systems. It includes a working vocabulary of computer and information system components, the fundamental principles of computer processing and a perspective for how non-technical people interact with technical people." Additionally, the Encyclopedia indicates "it also implies hands-on ability to work the operating system and common applications such as spreadsheets, word processors, database programs, personal information managers, email programs and Web browsers."

The Computer Literacy USA organization (2011) defines computer literacy as, "an understanding of the concepts, terminology and operations that relate to general computer use. It is the essential knowledge needed to function independently with a computer. This functionality includes being able to solve and avoid problems, adapt to new situations, keep information organized and communicate effectively with other computer literate people."

Are Today's College Freshmen Already Computer Literate?

McCoy's 2001 research identified competency in software productivity tools as the most important technical competency that students should have. More recent studies (Jennings and Wilson, 2006; Jennings, Wilson, Rucker, and Braathen, 2007) found high employer need for employees with skills in various Microsoft Office productivity tools. Kilcoyne *et al* (2009) looked at student confidence in mastery of technology and whether or not students' general confidence in their mastery of technology is actually

representative of their knowledge. Students averaged 42% on the test administered, and the authors concluded "students taking the test greatly overestimated their mastery of technology."

Dufrene, Clipson, and Wilson (2010) also examined first-semester college students' self-efficacy of computer application skills. Their study found that students self-reported "stronger than moderate skills in word processing, file management, presentation applications, and spreadsheet applications." In that same study, one-fourth of participants did not plan to take a computer course in college, and another one-half of the students were unsure as to whether they would choose to take a computer course. Heinrichs and Lim (2010) studied students' perceived functional skills and competency in word processing and presentation tools. Based on their findings, the authors concluded that schools "need to infuse software application productivity tools and collaborative competencies into the higher education academic curriculum to enhance information literacy." In that same study, the authors reported that students surveyed indicated a desire for a higher level of skills in those areas.

The Computer Literacy USA organization (2011) asserts that because schools, universities, and publishers have not established a meaningful definition of computer literacy, they cannot teach it effectively. This organization even writes, "many, if not most, college students (as well as faculty and staff) are barely functional."

Even this very brief review of related literature concerning college students' computer competency shows mixed findings. While some study results might suggest that it is no longer necessary at the post-secondary level to provide a dedicated computer literacy course for students, other studies suggest that student competency in key productivity tools is not sufficient when they enter the university. It is useful, therefore, to investigate whether institutions are retaining computer literacy requirements as part of their curricula or removing those requirements as the curricula decision makers perceive students are entering the institution with those competencies already achieved.

Problem and Research Method

The authors elected to research the status of computer literacy in public universities within the states included in the Federation of Business Disciplines geographic region. Thus the five states of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas were included in the study. All public universities in the five states that offered at least a bachelor's degree were identified from the website list of accredited member schools of the appropriate regional accreditation organizations (NCA-HLC, 2011; SACSCOC, 2011). The current online catalog of each school was then reviewed to gather information to answer each of the following research questions:

1. How frequently is computer literacy specifically referenced in the general education component (core curriculum) of four-year degrees offered at public universities in the five states?
2. If course credit is required in computer literacy, how many credit hours are devoted to computer literacy?
3. Do colleges of business within the universities reviewed include computer literacy within their "core" or "business foundation"?
4. How many credit hours do colleges of business devote to computer literacy?

Findings

The authors reviewed catalogs of 75 public universities within the five states. This included 10 in Arkansas, 15 in Louisiana, 6 in New Mexico, 13 in Oklahoma, and 31 in Texas. A complete listing of institutions reviewed can be found in Appendix 1. Forty-one schools included *some mention of* computer competency or literacy within the narrative of their core competencies for the bachelor's degree. However, as shown in Table 1, 65.3% (49 schools) *do not mandate a computer literacy requirement* within their core curriculum for all bachelor's degree students. In Texas, specifically, over one-third of the schools did mention that computer literacy was expected of their students upon graduation, even though only four schools specifically mandated credit hours of computer literacy. While 13 of the 15 Louisiana schools also mentioned that computer literacy was expected of their graduates, only 7 actually mandated credit hours of computer literacy.

Table 2 shows that when credit hours of computer literacy were mandated at the university level, the most common requirements was a three credit course. The authors do acknowledge in hindsight that no check was conducted as to whether any of the schools were operating on a quarter system as opposed to a semester system.

When the researchers took a more specific look at colleges of business within the public universities in the five states researched, the researchers found quite a variety of approaches. First, it should be noted that

a few of the schools did not have a college or school of business. In Oklahoma, students typically are required to complete a general education core (which contained a computer literacy requirement) before being accepted into a college of business. Thus the business cores in those schools did not include a computer literacy requirement. In some instances, the computer literacy course required was handled through other colleges, such as within a computer science department, an interdisciplinary studies department, etc. As Table 3 illustrates, 45 of the schools included a specific computer literacy within their business core (foundation).

Conclusions and Recommendations

This study provides a 2010 report of computer literacy expectations within public universities in Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. Although computers and mobile communication devices such as smart phones and iPads are ubiquitous today, approximately one-third of public universities in the five-state region continue to mandate a computer literacy requirement in their core curriculum required of all bachelor's degree students. In the majority of schools requiring computer literacy, the students will more than likely complete a three-credit course. Thus many schools are continuing to invest faculty resources in teaching computer literacy.

A closer investigation of colleges of business in these universities revealed that 60% included a computer literacy course within the business core (foundation). Once again, this course was most often designated a three-credit course.

Future research could address the actual content of the computer literacy courses required in colleges of business to determine the commonalities and/or differences in content that exist. For example, although the *PC Magazine Encyclopedia* included a reference to database software, is this software application typically included in a college of business computer literacy course? An expansion of this pilot study could include a comparison of the five states included in this study with other states across the U.S. Such a study could determine whether other regions also have a split opinion of the need to require computer literacy coursework at the university level.

References

Bourke, B., Bray, N., & Horton, C. (2009). Approaches to the core curriculum: An exploratory analysis of top liberal arts and doctoral-granting institutions. *The Journal of General Education*, 58(4), 219-240.

Computer literacy. (2011). Retrieved from http://www.businessdictionary.com/definition/computer-literacy.html.

Computer literacy. (2011). Retrieved from http://www.pcmag.com/encyclopedia_term/0,,t=&i+40158,00.asp.

Computer Literacy USA. (2011). The Computer Literacy Initiative. What is computer literacy? Retrieved from http://computerliteracyusa.web.officelive.com/default.aspx.

DuFrene, D., and Clipson, T., & Wilson, A. (2010). Measuring college students' technology self-efficacy. *Association of Business Information Systems 2010 Refereed Proceedings*, 13-20.

Heinrichs, J. H., & Lim, J. (2010). Information literacy and office tool competencies: A benchmark study. *Journal of Education for Business*, 85, 153-164.

Jennings, S. E., & Wilson, A. (2006). Are we teaching the computer application skills employers need? *Association of Business Information Systems 2006 Refereed Proceedings*, 57-62.

Jennings, S. E., Wilson, S. A., Rucker, J., & Braathen, S. (2007). Computer application employability skills. *Association of Business Information Systems 2007 Refereed Proceedings*, 11-16.

Karsten, R., & Schmidt, D. Business student computer self-efficacy: Ten years later. *Journal of Information Systems Education*, 19(4), 445-453.

Kilcoyne, M. S., McDonald, J., Hanson, B., Champion, S. Garland, M., & Maples, G. (2009). Can they really walk the talk? *Association of Business Information Systems 2009 Refereed Proceedings*, 55-60.

McCoy, R. W. (2001). Computer competencies for the 21st century information systems educator. *Information Technology, Learning, and Performance Journal*, *19*(2), 21–35.

North Central Association of Colleges and Schools, The Higher learning Commission. (2011). Directory

of institutions. Retrieved from http://www.ncahlc.org/component/option,com_directory/Itemid,184/.

Southern Association of Colleges and Schools, Commission on Colleges. (2011). Membership directory. Retrieved from http://www.sacscoc.org/membershipInfo.asp

Teske, B. (2010). Communication technology literacy at Louisiana Tech University. *Louisiana Libraries*. Winter 2010, 10-15.

Table 1
Schools Mentioning and Mandating Computer Literacy in the University Core Curriculum

State	No. of Public Institutions	No. Making Reference to C. L. in Discussion of Core	Schools Mandating Courses or Testing			
			Yes		No	
			No.	%	No.	%
Arkansas	10	1	0	0	10	100
Louisiana	15	13	7	47.0	8	53.0
New Mexico	6	4	3	50.0	3	50.0
Oklahoma	13	12	12	92.0	1	8.0
Texas	31	11	4	13.0	27	87.0
Total	**75**	**41**	**26**		**49**	

Table 2
Credit Hours Required When Computer Literacy Mandated

State	Schools	2 Hrs		3 Hrs		4 Hrs		6 Hrs		Variable No. of Hrs.	
	No.	No.	%	No.	%	No.	%	No.	%	No.	%
Arkansas	0										
Louisiana	7			3	43.0					4	57.0
New Mexico	3			1	33.3	1	33.3	1	33.3		
Oklahoma	12	1	8.0	11	92.0						
Texas	4	1	25.0	3	75.0						

Table 3
Status of Computer Literacy in the College of Business Core (Foundation) Curriculum

State	Comp Lit in COB Core		2 Hrs		3 Hrs		4 Hrs		6 Hrs	
	No.	%	No.	%	No.	%	No.	%	No.	%
Arkansas	6	60.0			6	100.0				
Louisiana	8	53.0			7	88.0			1	12.0
New Mexico	5	83.0			5	100.0				
Oklahoma	4	31.0			2	50.0			2	50.0
Texas	22	71.0	1	4.5	20	91.0			1	4.5

Appendix 1
Public Institutions Reviewed

Arkansas Universities
Arkansas State University
Arkansas Tech University
Henderson State University
Southern Arkansas University
University of Arkansas (Fayetteville)
University of Arkansas (Little Rock)
University of Arkansas (Monticello)
University of Arkansas (Pine Bluff)
University of Arkansas (Fort Smith)
University of Central Arkansas

Louisiana Universities
Grambling State University
Louisiana State University (Alexandria)
Louisiana State University (Baton Rouge)
Louisiana State University (Eunice)
Louisiana State University (Shreveport)
Louisiana Tech University
McNeese State University
Nicholls State University
Northwestern State University
Southeastern Louisiana University
Southern University (Baton Rouge)
Southern University (New Orleans)
University of Louisiana (Lafayette)
University of Louisiana (Monroe)
University of New Orleans

New Mexico Universities
Eastern New Mexico University
New Mexico Highlands University
New Mexico State University
Northern New Mexico College
University of New Mexico
Western New Mexico University

Oklahoma Universities
Cameron University
East Central University
Langston University
Northeastern State University
Northwestern Oklahoma State University

Oklahoma Universities (continued)
Oklahoma Panhandle State University
Oklahoma State University
Oklahoma State University-Oklahoma City
Rogers State University
Southeastern Oklahoma State University
Southwestern Oklahoma State University
University of Central Oklahoma
University of Oklahoma

Texas Universities
Angelo State University
Lamar University
Midwestern State University
PrairieView A&M University
Sam Houston State University
Stephen F. Austin State University
Sul Ross State University
Texas A&M Commerce
Texas A&M Corpus Christi
Texas A&M International
Texas A&M Kingsville
Texas A&M San Antonio
Texas A&M Texarcana
Texas A&M University Main campus
Texas A&M University Tarleton State
Texas Southern University
Texas State University @ San Marcos
Texas Tech University
Texas Woman's University
University of Houston
University of North Texas
University of Texas-Arlington
University of Texas-Austin
University of Texas-Brownsville
University of Texas-Dallas
University of Texas-El Paso
University of Texas-Pan American
University of Texas-Permian Basin
University of Texas-San Antonio
University of Texas-Tyler
West Texas A&M

NOTES

Cost of Spam to Academic Institutions

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Abstract

Unsolicited bulk emails, also known as spam email, place an enormous strain on internet resources and personal productivity. In this paper the latter is investigated. The cost of lost productivity for Yale University as a result of spam email is quantified. Based on a two-month moving average it is extrapolated that Yale University will lose an average of $2 million a month in 2010 due to spam.
Keywords: spam; filtering; legislation; education.

Introduction

As the internet continues to evolve and penetrate into every facet of daily life, its application and functions expand at an overwhelming rate. Today, e-mail is not only as easy to use as the telephone, but is also vital for keeping people in touch and for improving business productivity. However, e-mail's popularity has produced one very troubling side effect: spam. Spam is not only a nuisance and distraction but also a drain on productivity, an increasingly costly waste of time and resources for Internet Service Providers (ISPs) and for businesses large and small. With little cost and effort, one can send several thousand unsolicited messages in less than an hour. The result is not only slower internet traffic but also an unjust, costly, counterproductive, and time-consuming burden on the receiver.

Unsolicited junk email, commonly known as Spam email, is a nuisance to email users and costs business millions of dollars and lost productivity due to time spent dealing with it. Senders of email spam abuse the email system to send vast amounts of unsolicited email, usually for monetary gain from unsuspecting victims. Usually such spam is sent with the help of so-called botnets. These are networks of compromised computers that are used to conduct distributed denial of service attacks (DDoS), to collect private information such as credit card numbers, etc. Email spam is a modern day annoyance that causes real damage in the form of lost productivity and monetary losses. The lost productivity is due to the time spent filtering spam from useful mail. Monetary loss is also caused by email scams such as advance-fee scams (popularly known as 419 scams), stock market manipulation , identity theft, etc. Ferris Research (2009) estimates that in 2009 the cost of spam worldwide is $130 billion (Jennings, 2009). According to Symantec in 2009, an average of 87.4 percent of all email messages were spam (State of Spam, 2009). All of these figures illustrate the magnitude of the email spam problem.

Review of Literature

As the internet's electronic messaging capabilities are increasingly employed, the potential for abuse becomes more prevalent. The first instance of unsolicited bulk email was sent to 393 recipients advertising a new model of Digital Electronic Corporation computer. It was sent in 1978. The term *spam* is thought to have been derived from 1970 sketch by the famous English comedy troupe Monty Python. In the skit Viking patrons drown out all conversation by repeatedly singing "Spam, Spam, Spam … Lovely Spam! Wonderful Spam!". This is an appropriate analogy with modern day unsolicited bulk email because it drowns out all legitimate email and messages. As the usage of email has grown so has the amount of spam. According to the Radicati group 90 trillion email messages were sent in 2009. Approximately 247 billion emails were sent daily; with spam accounting for 200 billion (Number of emails sent worldwide, March 2010).

With ISPs offering "unlimited" dial-up access to the Internet for less than $20 per month and a phone line costing $15, a spammer can send roughly 10,000 e-messages for a penny (Schwartz & Garfinkel , 1998). Ironically, InfoWorld reports that unsolicited commercial e-mails cost U.S. companies $874 per employee per year in lost productivity. This cost does not include the irritation factor, its effect on morale, administrative time, server utilization, storage consumption, and network bandwidth losses (Calculator). In addition to slowing Internet traffic, other potential detrimental consequences include productivity and bandwidth losses, leakage of confidential information, and the transfer of viruses in e-mail attachments. With the loss of consumer time and productivity, coupled with the inappropriate material involved in many spam messages, it is no wonder that 80% of Americans find sorting through spam very annoying (Gaudin , 2003).

Spam in not only a source of annoyance for many email users but has serious monetary costs.

According to research by Intelligent Community Forum (ICF), spam email wastes 33 billion kilo watt-hours (KWh) of power every year, enough energy to power 2.4 million homes (Judge, 2005). Most of this energy costs come from computer sifting through email to separate legitimate email for spam email. Spam costs internet service providers (ISPs) and other organizations that process email in wasted bandwidth and other associated costs. Spam costs businesses $130 billion worldwide. The main components of this cost are

- Productivity loss from inspecting and deleting spam that gets missed by spam control products
- Productivity loss from searching for legitimate email deleted in error by spam control products
- Operations and helpdesk running costs
- (Ferris Research, 2009)

A slew of anti-spam measures, including legislation, software, and public education, have arisen to address this global problem. Although this paper will provide a synopsis of each of the above, the authors feel that nothing less than an integrated approach is necessary to significantly limit and potentially eliminate this ever-growing dilemma.

Methodologies for Minimizing Spam

To curb the mounting tide of spam several anti-spam methods have been devised. The battle against spam has generally been fought using four main approaches: using spam-filters, anti email forgery techniques, anti-spam legislation and end-user anti-spam education.

Spam filters

Spam filters use various approaches to separate legitimate email from spam email. Spam filters can generally be categorized as being Content-based, Bayesian, Whitelists/Backlists, Challenge response or Community-based filters. Content-based filters filter out spam based on the appearance of popular spam words and phrases in the content of email. Invented by Paul Graham (Graham, 2002), Bayesian spam filters are based on Bayesian Theory developed by Thomas Bayes in 1702. This technique uses statistical approach to assign email a probability of being spam or not based on the appearance of spam features in the email. Whitelist filters will block email that does not originate from a list of legitimate sources and conversely a backlist filter will block email received for a list of know spam sources. Challenge response filters require the sender of email to perform further action, such as reading instructions from the challenge message instructing the sender to include a specified pass-code in their reply, to ensure that their email will be received. Under the community based filter approach, whenever the user encounters email spam they report it, if enough people report a particular email as spam that email will be filtered out. The different categories of filters are summarized in table 1(see appendix).

Anti-email forgery technology

Simple Mail Transfer Protocol (SMTP), the protocol that dictates how email is sent, was developed in the 1970s, a time when the internet was much smaller and the participants could be trusted. Due to this fact the protocol was not developed with checks and controls that would prevent abuse by untrustworthy participants such as spammers. Spammers and scammers in general have taken advantage of this lack of checks and controls to forge emails so as to conceal their source. In response to this challenge various techniques and best practices have been developed by email service providers and administrators. These include domain keys verification, Sender Policy Framework (SPF) validation, reverse domain name service (rDNS), and DNS based blacklist (DNSBL).

Domain Keys Verification

Domain Keys Identified Mail (DKIM) is a method for verifying email that uses public-key cryptography to authenticate email. It was invented by Mark Delany of Yahoo! Mail (Delany, 2007). It verifies that the origin of any email received coincides with the claim of its origin. Using DKIM senders sign their email using a private key that is only known to them. Upon receipt of the email the receiver uses the public key to verify whether the signature was generated by the matching private key. In order words it uses the public key to authenticate the sender. Spammers usually put false email addresses in their email headers so that they do not have to deal with emails bouncing back to them (this is known as backscatter). DKIM counters this by ensuring the email in fact comes from where it claims to come from.

DNS based Blacklist

DNS based Blacklist (DNSBL), another technique used to combat spam (Iverson, 2007), are public lists of domains know to be used to send spam. Email providers and ISPs use these lists to filter email coming from these domains. Popular blacklists include those operated by SpamCop and Spamhaus. The organizations that administer these lists often provide mechanisms for domain owners, with good reasons as to why their domains should not be blacklisted, to remove their domains from the list.

Reverse DNS
Spammers sometimes use invalid and dynamically assigned IP addresses. Reverse Domain Name Service (rDNS) lookup is used to find the domain name corresponding to an email sender's IP address (What is Reverse DNS, n.d.). If the IP address corresponds to a domain name that is likely the sender of spam, like a dynamically assigned IP address, and then the email is filtered out.

Sender Policy Framework
Since spammers routinely forge the source of the email, Sender Policy Framework (SPF) is a technique used to counter this (Sender Policy Framework, 2008). Using SPF any sender can publish a DNS record specifying exactly which machines are authorized to send email from that domain. Any email claiming to come from a domain that uses SPF has to be sent by the authorized machines; if not, it is rejected by the recipient.

Anti-spam Legislation
In a recent poll conducted by Harris Interactive, an overwhelming majority (74%) of online users favour actually making spam illegal (Wolfe et al., 2004). Demand for limiting spam has prompted a slew of aggressive legislation at both state and federal levels with limited effectiveness. In 1977, Nevada was the first state to enact anti-spam legislation, and between 1999 and 2003, thirty-one other states have enacted laws restricting spam (Wolfe et al., 2004). Provisions of various state laws include: opt in or opt out options, in which senders need recipients' permission to send e-mail (opt in) or recipients have the right to be removed from mailing lists (opt out); ADV or ADLT labels, where commercial e-mails must be labelled with a variation of these letters on the subject line; no false routing, where forged or falsified routing information is prohibited; and no misleading subject lines, which is a ploy to coerce or trick recipients into opening a message. Specified contact information must be provided including name and address whereas using third parties' domain names to send bulk e-mail is prohibited (Levine et aI., 2004). State legislations vary in their strictness; for example, the California Spam Law (formerly SB 186) is one of the more stringent anti-spam laws as seen in Table 2 (Spring, 2004), see appendix. In December 2004, an ISP in Davenport, Iowa was awarded $1 billion in an anti-spam suit under an Iowa law that allows plaintiffs to claim damages of $10 per spam message. This constitutes the largest judgement ever against spammers (CNN.com, 2004).

State laws, however, may be pre-empted by a new federal law that went into effect on January 1, 2004. The new law, known as the Controlling the Assault of Non-Solicited Pornography and Marketing Act of 2003 or CAN-SPAM Act of 2003 imposes stiff monetary penalties and in some instances even jail terms (Table 2, see appendix). Basically, the Act that requires commercial e-mail should be non-deceptive about its origins. It forbids spammers from disguising themselves using falsified names, addresses and fake hosts, and also prohibits the use of address harvesting programs. The Act contains some stringent enforcement mechanisms with the most serious offenders facing $6 million or more in fines (Wolfe et aI., 2004). However, as of October 2004, only 4% of all unsolicited commercial e-mail complied with the law according to e-mail security firm MX Logic. Furthermore, they estimated that spam constituted 80% of all e-mail traffic, up from 60% at the beginning of the year (Spring, 2005).

Additionally, the Congress approved Senate bill 1052, Ban on Deceptive Unsolicited Bulk Electronic Mail Act of 2003; the bill is just one of many pending consideration. This legislation makes it illegal to forge mail headers and for the sender to masquerade as someone else. It also has provisions making it unlawful to harvest e-mail addresses from anywhere to build lists of targets. Lastly, it harbours a hotly contested point: the opt-out clause, which forces the sender to provide a mechanism for the receiver to be removed from its lists (Wolfe et al., 2004).

In March 2003, a bill entitled Computer Owners' Bill of Rights was submitted to Congress requiring the Federal Trade Commission (FTC) to establish a 'do not e-mail' registry for individuals/entities who do not want to receive unsolicited bulk e-mail. The FTC would possess the authority to impose civil penalties upon those in violation (108th Congress, 2003). According to Congress, the problems associated with the rapid growth and abuse of unsolicited commercial e-mail cannot be solved by Federal legislation and development and adoption of technological approaches and the pursuit of cooperative efforts with other countries will be necessary as well (Wolfe et al., 2004). Indeed spam is a global problem. Many spammers are impossible to find because they employ servers in foreign countries or are themselves located in foreign countries. Furthermore, spammers in the USA can easily relocate their businesses offshore and continue to spam.

Some critics of anti-spam legislation claim such laws only drive the worst abusers of commercial e-mail overseas. China, Russia, Brazil, Argentina and South Korea represent the leading countries where spammers have found ISPs willing to provide support

services. The internet security firm, Sophos, found that the proportion of global e-mail originating in China and Hong Kong rose from 6% in February 2004 to 12% six months later. Likewise, Korea's share increased from 6% to 15% during the same period (Spring, 2005). In a global effort to minimise spam, the European Union passed a 2002 law banning all unsolicited commercial e-mail. The South Korean Parliament enacted an anti-spam law in 2002 based on an opt-in approach. As of late 2003, anti-spam legislation was being considered in Canada, Australia and China (Levine et al., 2004). In December 2003, the United Nations created an initiative to address spam worldwide. One of the timeliest resources for keeping up with the spam legislation efforts worldwide can be found at spamlaws.com (Wolfe et al., 2004).

Anti-Spam Education

In addition to employing anti-spam technology and legislature, another important defense against spam is to empower the end users of email with information to help combat spam. Such education involved making users aware of the latest technique used by spammers, making them aware of the latest tools to fight spam, and educating them on best practices to use when using the internet in order to reduce spam to prevent them from being the victim of spammers.

Some simple methods that users can apply include:

- Avoiding responding to spam – by responding to spam the spammer is made aware that the user is in fact receiving the spam email.
- Not displaying email in public forums and other public areas on the internet – Spammers often use computer programs to automatically harvest email addresses from public forums and other areas on the internet.
- Disabling image display in email clients – Images in email often link to and downloaded from external websites. If images are present in spam email, displaying these signals the spammer that the user's email address is active and the user is in fact reading the email.
- Avoid forwarding chain emails - Chain emails are often used by spammers to harvest email addresses. Often when emails are forwarded they expose the email addresses of all the recipients. This serves as a rich source of email addresses for the spammers.
- Making sure they are using up-to-date anti-virus software – spammers usually use malware downloaded onto victim's machines to turn their computers "zombie" remotely controlled to send spam. By running up-to-date anti-virus software such malware can be detected and removed.
- Reading privacy policies before disclosing your email address – Some websites often sell their users emails to third parties. By reading privacy policies users are able find out how their email address and other private information will be used.

Results

Email and spam data was collected from publicly available data from Yale University's Information Technology Services (ITS) department (Yale University, 2010). This data included the amount of email processed and spam detected by Yale's ITS department between the periods of December 2006 and December 2009. The lost of productivity is quantified by using the figure of $0.01 - $.04 per spam email as specified by Epostmarks (Epostmarks, 2009).

Our results show that spam cost Yale University between $8.1 and $32.4 million in terms of lost productivity in 2007, which rose to between $11.6 - $46.2 million in 2008. Finally, in 2009 it cost $7.5 - $30 million.

Figure 1 (see appendix) shows the total amount of email delivered to Yale University. It also shows the amount, out of the total email delivered, that was categorized as spam. An average of 85 percent of all email delivered during the time period was spam. This figure is in line with State of Spam (December, 2009) which states that an average of 87.4 percent of all email is spam.

Figure 2 (see appendix) shows the percentage of email that is categorized as spam from December 2006 through December 2009.

Figure 3 (see appendix) shows the estimated amount of money lost due to lost productivity that would have occurred due to spam. It shows a low estimate and a high estimate. If spam is allowed to reach users' inboxes without being identified users will lose productivity because they will have to deal with the spam. We use the figure of $0.01 and $0.04 per spam email to quantify the productivity lost.

The two year moving average method is used to forecast the future cost due to lost productivity, of spam email to Yale University. We calculate that the university will lose an average of between $537,000 and $2,148,000 *per month* in 2010.

Conclusion and Future Work

From the above mentioned results it can be seen that spam exerts a tremendous strain on the internet and academic institutions in particular. It wastes internet bandwidth, and needs tremendous resources to detect and block it. It is also to source of numerous scams such as advanced fee fraud scams (419 scams), stock scams, phishing scams, etc. It also serves as a vector of malware such as Trojans and viruses. Spam's biggest impact is loss of productivity as users spend their time sorting through spam instead of dealing with more productive endeavors. In this paper we tried to quantify this cost so as to highlight this problem. Future work on this paper could be an extended look at the cost of spam to several other academic institutions apart from Yale University.

Despite current laws aimed at minimizing spam, vast amounts of unsolicited bulk e-mail continue to be sent at minimal cost. Future efforts to minimize spamming will undoubtedly include a combination of aggressive legislation, new technological solutions, and increased public awareness and education. Existing laws should be reviewed and amended periodically to allow for appropriate evolution. Finally, international collaborative efforts will be required to manage this global problem.

Limitation

One limitation of this study is that it was limited to Yale University. This was due to that fact that Yale University makes Spam data available to the public. Most institutions either do not collect such data or tend to keep these data private. Due to this fact, the conclusions that are made here do not give us a broad picture of the impact of Spam in academic institutions in general.

References

CNN (2004). Spammers ordered 10 pay $1 billion. Retrieved on June 4, 2009 from http://www.cnn.com/2004/LAW/12/18/spam.lawsuit.ap/index.html

Delany, M. (2007). One small step for email, one giant leap for Internet safety. Available online at http://ycorpblog.com/2007/05/22/one-small-step-for-email-one-giant-leap-for-internet-safety/. (accessed on 22 October 2009).

Epostmark. (2009). The true corporate costs of spam. Retrieved June 23, 2010 from http://blog.epostmarks.com/team-blog/2009/3/21/the-true-corporate-and-consumer-costs-of-spam.html

Ferris Research. (2009). Industry statistics. Retrieved June 23, 2010 from http://www.ferris.com/research-library/industry-statistics/.

Graham, P. (2002). A plan for spam. Retrieved June 23, 2010 from http://www.paulgraham.com/spam.html

Iverson, A. (2007). What is a DNSBL. Retrieved on October 22, 2009 from http://www.dnsbl.com/2007/01/what-is-dnsbl.html.

Judge, P. (2005). Report shows spam's massive carbon footprint. Retrieved June 23, 2010 from http://www.eweekeurope.co.uk/news/news-security/report-shows-spams-massive-carbon-footprint-632

Levine, J., Young, L. and Everett-Church, R. .(2004). Fighting Spam for Dummies, in Wiley Publishing rnc., Indianapolis.

Number of emails sent worldwide. (2010). Retrieved June 23, 2010 from http://gorumors.com/crunchies/global-email-statistics/

Sender Policy Framework. (2008). Retrieved October 22, 2009 from http://www.openspf.org/Introduction.

Spring, T. (2004). 'Spam laws; bark or bite', PC World, p.38.

Spring, T. (2005). 'Spamlaw test', PC World, pp.20-22.

State of spam. (2009). Retrieved January 1, 2010 from http://eval.symantec.com/mktginfo/enterprise/other_resources/b-state_of_spam_report_12-2009.en-us.pdf

What is Reverse DNS. (n.d.). Available online at Retrieved October 22, 2009 from http://www.tech-faq.com/reverse-dns.shtml

Wolfe, P., Scott, C. and Erwin, M. (2004). Anti-Spam Tool Kit, Emeryville, McGraw-Hill/ Osborne, CA.

Yale University. (2010). Retrieved June 23, 2010 from http://www.yale.edu/its/metrics/email

Table 1: The different categories of spam filters

Content based filters	They filter out spam based on the appearance of popular spam words and phrases in the content of email.
Bayesian filters	Invented by Paul Graham (Graham, 2002), they are based on Bayesian Theory developed by Thomas Bayes in 1702. This technique uses a statistical approach to assign email a probability of being spam or not based on the appearance of spam features.
Whitelists/Blacklists filters	With this approach the whitelist filter will filter out email that does not originate from a list of legitimate sources; conversely a backlist will filter out email received from a list of known spam sources.
Challenge response filters	Such systems require the sender of email to perform further action to ensure that their email will be received.
Community based filters	Under this approach, the users report email spam ; if enough people identify a particular email as spam that email will be filtered out.

Table 2: Comparison of California vs. Federal Anti-spam Laws

California Spam Law	**Federal CAN-SPAM Act of 2003**
Unsolicited commercial e-mail may not be sent from California or to a California address.	Unsolicited commercial e-mail must be labeled, and must include opt-out instructions and the sender's physical address.
The laws apply to senders as well as the advertisers on whose behalf messages are sent.	Deceptive subject lines and false headers are prohibited.
Damages may be up to $1000 for each message sent to an individual, and up to $1 million per incident.	Violators face jail sentences of up to a year and fines of up to $1 million. Repeat offenders face jail terms of up to five years.
Exempted are companies that you (the e-mail recipient) have done business with, as well as companies whose commercial messages you have opted to receive.	Federal law pre-empts any state laws that prohibit unsolicited commercial e-mail outright. The FTC is authorized to establish a 'do-not-e-mail' registry.

Figure 1: showing the amount of email delivered and the amount marked as spam

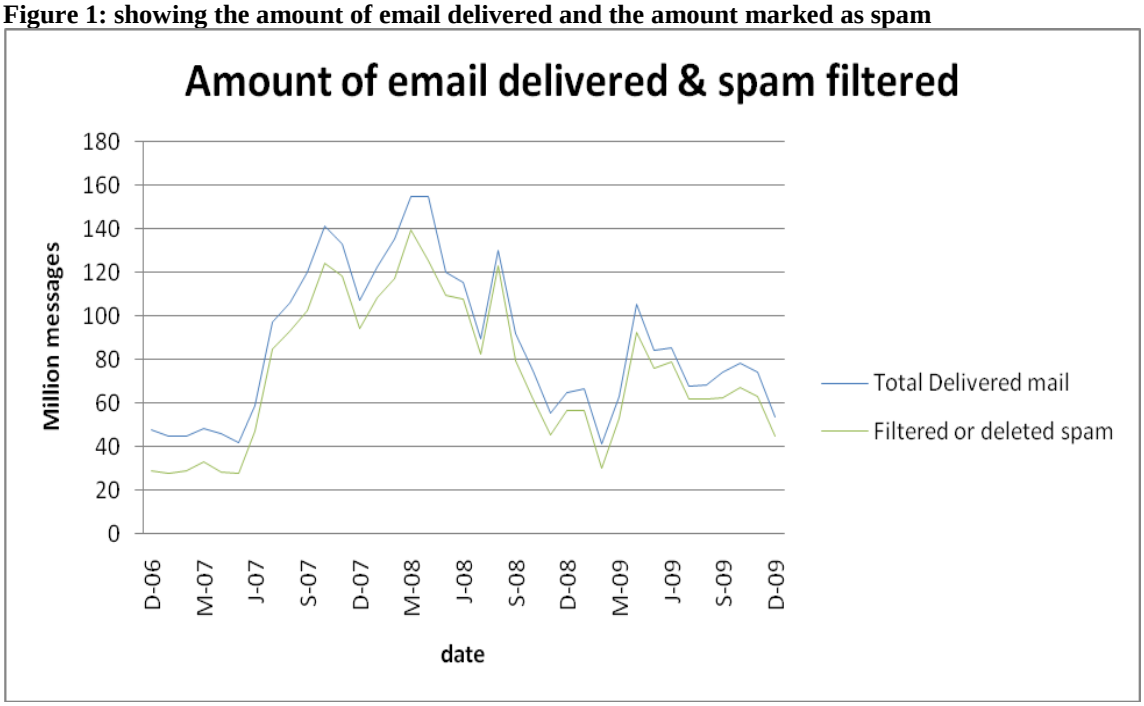


Figure 2: Percentage of email that is categorized as spam

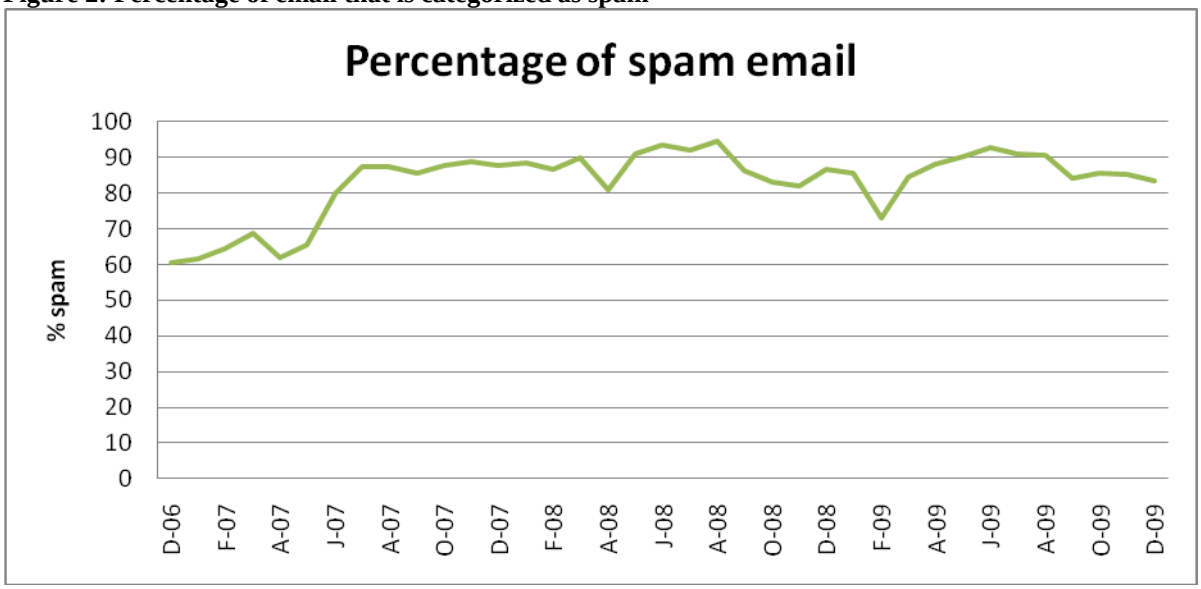
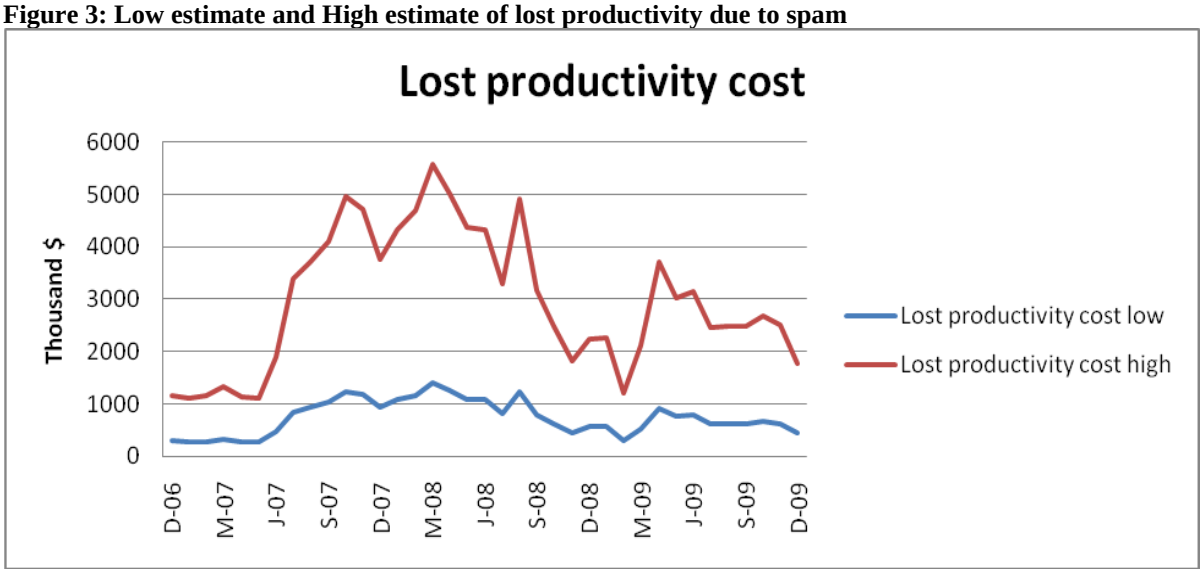


Figure 3: Low estimate and High estimate of lost productivity due to spam



DESIGNING DATA AND COMMUNICATION (CONVERGENT TECHNOLOGY) CLASS USING THEORY AND HANDS-ON LAB EXERCISES

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Abstract

Voice over Internet Protocol (VoIP) is becoming increasingly popular and important in the telecommunications sector for organizations and private uses. Most organizations are interested in VoIP solutions that integrate voice, data, and video using existing networking infrastructure. An integrated voice and data solution would allow organizations to carry voice applications on the existing data networks. Many colleges have introduced convergence technology courses into their undergraduate and graduate level curriculum. The course is designed to teach students how to plan, design, implement, and maintain convergence technology using various approaches ranging from purely theory based to a good mix of hands-on and theory based. During the process of teaching convergence technology using a hybrid approach of theory and hands-on, the authors experienced many challenges and issues. Among challenges and issues of teaching a convergence class is research of learning styles; study of course content, and lab setup and configuration. This paper describes the authors' experiences and lessons learned from teaching convergence technology at the local college in Texas.

Introduction

Voice over Internet Protocol (VoIP) is becoming increasingly popular and important in the telecommunications sector for organizations and private uses. Most organizations are interested in VoIP solutions that integrate voice, data, and video using existing networking infrastructure. An integrated voice and data solution would allow organizations to carry voice applications on the existing data networks. The voice signal is digitized, compressed, and converted to internet protocol (IP) packets, and then transmitted over the IP network. In the VoIP environment, signaling protocols are used to setup and tear down calls that carry information required to locate users, and negotiate capabilities (VoIP, 2005).

Many colleges have introduced convergence technology courses into their undergraduate and graduate level curriculum. The courses are designed to teach students how to design, implement, and maintain convergence technology using various approaches ranging from purely theory based to a good mix of hands-on and theory based. Research has showed that students' learning is enhanced if they can engage in a significant amount of hands-on lab exercises (Bishop and Heberlein, 1996). At the college, students are required to take a convergence class as part of the requirement for the Bachelor of Applied Technology – Computer Information Technology (BAT-CITP) degree.

During the process of teaching convergence technology using a hybrid approach of theory and hands-on, the authors experienced many challenges and issues. Among challenges and issues of teaching a convergence class is research of learning styles; study of course content, and lab setup and configuration. This paper describes the authors' experiences and lessons learned from teaching convergence technology at the college. There are four courses that were required for students to be competent and knowledgeable in Convergence+ Technology: Fundamental of Networking Technology, Networking with TCP/IP, Advanced Networking, and Convergence Technology.

Statement of Problem

Many organizations have implemented or are going to implement VoIP in their network because they would like to reduce costs and to ease management for their network infrastructure (Global Knowledge, 2005). This paper will explain how instructor can effectively and efficiently teach a convergence technology class, so student's learning and success can be accomplished. The program's mission is to prepare students with the necessary knowledge and skill so they can be ready to enter in the workforce after they graduate. By offering this class in the curriculum, students will be exposed with a wide variety of information and communication technology (ICT) skills that are in demand in today's

competitive market. Thus, when students graduate from this institution, they can be better prepared.

Literature Review

It is important for instructors to recognize students' learning styles because they help instructors to adapt their teaching methods accordingly; moreover, students who know their own learning style become better learners and instructors can make adjustments of how to present the materials. Students often learn in many different ways and one approach to teaching does not work for every student. According to Fleming's VARK model (Leite et al, 2009), there are four categories that reflect the experiences of their students: visual (V), auditory(A), read/write(R), and kinesthetic (K).

Visual learners usually have a preference of viewing information such as thinking in pictures and using visual aids such as overhead slides, diagrams, or handouts. Auditory learners best learn through listening such as lectures, discussions, and tapes . Tactile/kinesthetic learners prefer to learn via experience such as through moving, touching, and doing (active exploration of the world, science projects with experiments (Flemings, 1992). Students can use the model to identify their learning style and maximize their educational experience by focusing on what benefits them the most. Knowing and understanding students' learning styles help us to learn more effectively. Its use in pedagogy allows teachers to prepare classes that address each of these areas.

Another theory of learning styles is Myers-Briggs Type Indicator (MBTI). The tool was developed by Isabel Briggs Myers in the 1950s. Learning is enhanced when instructors and students understand their teaching styles and learning styles. Whatever the circumstances of people's lives, the understanding of learning types can make perceptions more clear, judgments more sound and decisions closer to a person's heart's desire (Briggs Myers). Below is the Myers-Briggs Type:

- *Favorite World*: Students who focus on the outer world are called extroverted; Students who focus on their own inner world are called introverted.
- *Information:* Students who prefer to focus on the basic information are called intuitive; Students who prefer to interpret and add meaning to the basic information are called sensing.
- *Decisions:* Students who first look at logic and consistency are called thinking; Students who first look at the people and special circumstances for decision making are called feeling.
- *Structures:* Students who prefer to get things decided are called judging; Students who prefer to stay open to new information and options are called perceiving.

Paraphrased from the MBTI Manual: A Guide to the Development and User of the Myers-Briggs Type Indicator

Content of the Course

Protocols

There are many different types of protocols used in VoIP systems including Internet Protocol (IP), Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Real Time Transmission Protocol (RTP), and Real Time Transmission Control (RTCP). (Comptia Convergence+, 2008). The authors will discuss each of the above listed protocols and its role.

1. TCP is a reliable connection-oriented protocol that allows packets sent from one host to another without losing any data. It is located in the transport layer of the OSI model. However, a TCP is not well suited for voice because it requires re-transmission packets that cause delay. Callee may think that the call was dropped as they wait for the audio to arrive.
2. IP is a protocol used for communicating data across a packet switched network. It is an unreliable protocol and is not directly suitable for VoIP because it does not do data error correction; it detects errors only in the header.
3. UDP is an unreliable protocol that transmits packet without any guarantee or acknowledgement (best-effort) of the delivery. It is used in many applications requiring real-time transport such as VoIP application. Some functionality including transmission multimedia in real time and network performance report cannot be achieved using UDP, thus VoIP may use other protocols such as RTP and RTCP.
4. The RTP is a standardized packet format for delivering multimedia over the Internet. It was developed by International Engineering Task Force (IETF), and was first published in 1996 as RFC 1889, and superseded by RFC 3550 in 2003. RTP is a connectionless and unreliable protocol that rides atop a UDP data stream which provides all of the functionality of real-time data such as VoIP. It features low overhead, dynamic header compression, data security, and signal-

loss detection. In addition, RTP has the following capabilities:
   a. Time stamping
   b. Gap identification
   c. Delivery monitoring
   d. Payload identification
5. RTP is used in conjunction with the RTCP.
6. RTCP is a protocol that helps RTP. It is used to provide network performance data including sender report, receiver report, source description, a bye message, and application specific. Furthermore, the purpose of RTCP is to collect and provide a report on latency, jitter, and delay. While RTP carries the media streams (e.g., audio and video) or out-of-band events signaling, RTCP is used to monitor transmission statistics and quality of service (QoS) information.

On the other hand, H.323 and SIP are *signaling protocols* used to establish communication to exchange audio and video media streams. H.323 is a protocol standard for multimedia communications which was designed to support real-time transfer of audio and video data over packet networks. Session Initiation Protocol (SIP) is a network communications protocol commonly employed and widely used for VoIP signaling in today's VoIP systems. According to RFC 2543, SIP protocol is an application layer signaling control protocol used to establish, maintain, and terminate multimedia sessions. SIP is a text-based protocol and part of the IETF multimedia architecture. It was standardized after H.323 in1999.

A codec is an encoding and decoding a digital data stream or signal. The Gxx series audio are the most commonly codec utilized. Some of the most popular codecs are as follows: G711 supports uncompressed audio encoding at 64 Kbps, G729 supports compressed audio at 8 Kbps and provides toll-quality voice, iLBC supports compressed audio at 15.2 Kbps, and G723 supports compressed audio at 5.3 Kbps.

SIP Discussion

SIP serves as several functions including proxy, registrar, and redirect server (Comptia Convergence+ 2009). Proxy server is similar to the role of HTTP server; it accepts requests from clients and transfers them to other SIP servers for processing. Redirect server is to accept call routing information to the client that initiates a call. Registrar server is to map client addresses to user names – uniform resource identifier (URI) by accepting registration requests from SIP clients.

A complete process of a VoIP call is called a session. The sender who is initiating the call sends out an invite and at the same time, the phone sends a response 100 (trying to connect). As soon as the receiver phone starts ringing a response 180 (phone is ringing) is sent back. The receiver picks up the phone, the called phone sends a response 200 (ok). The sender phone responds with method ACK (acknowledgment message). RTP transmits the conversation as data. When the sender hangs up method BYE (ends SIP session/call) request is sent which responds with method OK response 200.

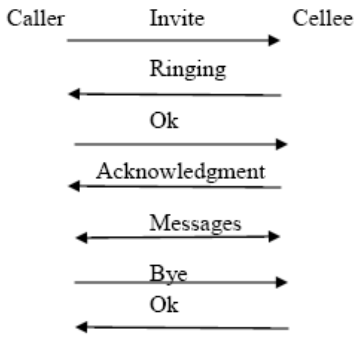


Figure 1. *Source: CompTIA Convergence+ Certification, ILT Series*

SIP session is composed of a method and includes response codes (Global Knowledge, 2007). There are two types of responses: provisional (class 1XX) and final (class 2XX, 3XX, 4XX, 5XX, 6XX). See figure 2. The difference between a final and provisional message is that the SIP transaction provisional indicates progress, but does not terminate SIP transactions. SIP messages describe how the message is handled and what action should be taken. The following is six response codes available for SIP:

According to RFC 3261, there are six different method types used for SIP method types. The following is a list of SIP methods:

- OPTIONS - For querying servers about their capabilities
- INVITE - Starts a SIP session
- ACK - Acknowledgment messages
- BYE - Ends a SIP session
- CANCEL - Terminates a request; caller hanging up the call
- REGISTER - Registering contact information

Quality of Service (QoS)

QoS is defined as the tools and technologies that manage network traffic in order to provide the performance demanded by the users of the network (Carperter, 2009). To achieve the quality of QoS in

VoIP systems, organizations must analyze the jitter, packet loss, and delay. (Carperter, 2009). Bandwidth is a measure of a network's ability to transfer data. The greater the bandwidth, the more data and voice can be transmitted in a given amount of time. However, in practice, the network administrator must be concerned with the throughput in the network. Throughput is a more realistic assessment of the network capability because it considers the processing and overhead time such as network adapters, routers, and other devices on the network.

Delay is the measurement of time required to move the VoIP packets/data from one point to another across the network. Delay is affected by a number of factors including bandwidth, efficiency, and network utilization. The industry standard suggested that no more than 150 milliseconds delay one way. The second component of QoS is jitter. It is referred to as the variable of packet arrival. Jitter can cause a call to drop or lead to poor quality. Jitter buffers are normally implemented to change asynchronous packet arrivals into a synchronous stream by turning variable network delays into constant delays at the destination end systems, thus the QoS will be attained. The third component of QoS is packet loss. It refers to the loss of packet during transmission. A few packet losses in data network is usually tolerable, however, in the voice network is not tolerable. Most ISPs usually have less than three percent of packet loss. If there are too many packets lost during the transmission, it will affect the voice quality.

Methodology

At the college, we provide students with the necessary knowledge and skill, so they can be ready to seek VoIP – related employment. The convergence technology course consists of a lecture and laboratory session. During the lecture session, the concepts and theories of network infrastructure and VoIP are discussed. The lab session helps students to apply the concepts and theories they have learned into actual devices. Generally, students learn better if they actually work on the real equipments rather than theories only. In the classroom, we assigned students into a group of four consisting of experienced and non-experienced students. Therefore, each member in the group can help each other while working on the labs. Due to the limitations of equipment, each group will consist of four students; however, ideally the instructor prefers to have two students per group. There are normally 16 – 20 students in the classroom.

Hardware and Software Requirements

The following is a list of hardware requirements to setup the lab: Cisco IP Phone 942, Cisco Integrated Service Router (ISR) 1811, regular analog phone, Phone analog adapter (Sipura), and power strip. In addition to the above hardware requirements, students are also required to have the following software: IP PBX application (Brekeke), Java 1.5, Simple Domain Name Service (DNS), and X-lite soft phone.

Lab Configuration

First, the students were given an overview of the logical topology of how the lab is set up. There is one PC for each group which consists of a base PC and a virtual PC. Students setup the virtual PC using a virtual application such as Microsoft Virtual PC or VMware. For the purpose of the lab, students install window XP operating systems in both base and virtual PC. Hyperterminal, Simple DNS, and packet capture software (Wireshark) are installed in base PC. IP PBX application (Brekeke) was installed in the virtual PC. The name of the base PC is PodX and the virtual PC is SIP00X substitute x with the pod number. There are eight LAN ports and two WAN ports in the router. Ports 2 – 4 were configured as VLAN 10 data and ports 5 – 7 were configured as VLAN 50 voice. Port 1 is connected to the HQ Router for outside connection. The SIP phone is connected to port 5 and analog phone is connected to port 6 (voice VLAN). The PC is connected to port 2, thus the soft phone (X-Lite) was in the data VLAN. See figure 3.

The Base PC uses 192.162.X0.101 (Class C addressing), the subnet mask is 255.255.255.0, gateway is 192.168.X0.1, DNS address is 192.168.X0.101, the virtual PC use 192.168.X1.102. See figure 4.

Students need to fully understand the logical topology in order to setup the lab properly. Without having a solid knowledge and understanding in the logical topology, students may experience difficulty during the set up and installation of the equipments in the lab.

Lessons-Learned

Lessons-learned from teaching convergence class are as follows: some of the issues that arise during the class hands-on lab exercises are the need of well–written documentation and lack of students' skills/knowledge. Since the technology is always changing so rapidly, it is often difficult to continuously keep up the documentation. The lab

documentation does not always reflect the recent upgrade software. For example, the documentation may show Brekeke version 1.2.2 , while the real application use version 1.3.1. Moreover, some students also may have forgotten the Cisco command to configure the router, since they took the Cisco classes few semesters ago. The instructor should provide a review or refreshment materials at the beginning of class, before students actually do the real hands-on exercise.

In setting up the convergence labs, we faced a number of issues and challenges. Some of these presented themselves at the beginning, while others were not realized until the lab was put into place. This section will outline these issues and challenges. There are several issues in terms of technical aspects. There was a group that was having an issue on the router configuration. After troubleshooting several times, one of the members in the group found that the spyware program may have affected the router to load the startup configuration. Removing the spyware program actually solved the problem. Other issues include typos on the router configuration For example, students may have entered the wrong IP address for data vlan and/or voice vlan. Students are advised to read and understand the manual carefully before typing in the computer. Configuring an analog phone adapter is a challenging task. For the analog phone adapter, students need to enable the web-based configuration. Without enabling the web-based configuration feature, students were not able to install and setup the phone adapter through a browser, although they put the correct IP address. It was disabled by default.

Some of the issues that arise during the class hands-on lab exercise are documentation and students skills/knowledge. Since the technology always changing so rapidly, it is often difficult to continuously keep up the documentation. The lab documentation does not always reflect the recent upgraded software. For example, the documentation may show Brekeke version 1.2.2 while the real application uses version 1.3.1. Moreover, some students also may have forgotten the Cisco command to configure the router, since they took the Cisco classes few semesters ago. Instructor would like to provide review or refreshment materials at the beginning of class before students actually do the real hands-on exercise.

Conclusion

The reasons that many organizations are adopting VoIP systems in their telecommunication and network infrastructures are, lower costs and increased functionality. Because many organizations already have their data network's infrastructure in place, the cost of implementing the voice over IP technology is not too substantial. Reserving extra bandwidth for the quality of service required and the new phones that actually interface with your data network instead of the POTS lines of your typical ATA phones are an important component of the implementation.

VoIP is becoming one of the most important emerging technologies in telecommunications because of its ability to integrate communication services into the IP network infrastructure, the Internet (especially e-mail and instant messaging), and standard classical services like telephony. Without proper planning, security and QoS, VoIP can lead to potential issues with its confidentiality, integrity, and availability of the data and information, which streams through the network. Careful planning must be put into place for any VoIP implementation with focus on network security and emphasizing maintaining the efficiency of the system. Finally, an instructor will adjust the teaching methodology and class instruction that fit to students from various backgrounds.

References

Bishop, M. & Heberlein, L.T. (1996). National Information Systems Security Conference. *An Isolated Network for Research*. Baltimore, MD

Carpenter, T. (2009). Comptia Convergence+. New York: McGraw-Hill

Comptia Convergence+ Certification. (2009). Massachusetts: Axzopress.

Dunte, M & Ruland, C. (2007). Secure voice over IP. *International Journal of Computer Science and Network Security*. (7)6, 63-68.

Fleming, N.D. and Mills, C. (1992). *VARK a guide to alearning sytles*. Retrieved from http//www.vark-learn.com.

Global Knowledge. (2005). VoIP: How to Plan for the Bandwidth and Calculate Cost Savings.

Global Knowledge (2007). Voice over IP Foundations.

Hawk, T.F. & Shah, A.J. (2007). Using Learning Style Instruments to Enhance Student Learning. *Decision Sciences Journal of Innovative Education*. (5)1, 1-19.

Kumar, A. (2006). An Overview of Voice over Internet Protocol (VOIP). *River College Academic Journal,* 2(1), 1-13.

Kuhn, R.D., Walsh, T.J., & Fries, S. (2005). Security considerations for voice over IP systems. Gaithersburg. MD: National Institute of Standard Technology.

LdPride. (2001). http:// www.ldpride.net/learningstyles.MI.htm#Learning%20Styles%20Explained.

Leite, Walter L.; Svinicki, Marilla; and Shi, Yuying. (2009). *Attempted Validation of the Scores of the VARK: Learning Styles Inventory With Multitrait–Multimethod Confirmatory Factor Analysis Models.*

Slay, J. & Simon, M. (2009). Voice over IP: privacy and forensic implications. *International Journal of Digital Crime and Forensic.* (1)1, 89-101.

Sharma, S.K & Sefchek, J. (2007). Teaching information systems security courses: a hands-on approach. *Computer Security*. (26), 290-299.
Voice over IP: Protocols and Standards. Retrieved October 17, 2005, from http://www.voip-voice-over-ip.com/internetphone/protocols.htm

Yu, Y. (2007). Designing hands-on lab exercises in the network security course. *Journal of Computing Sciences in Colleges***.** (22)5, 105-110.

Figure 2.
Source: CompTIA Convergence+ Certification, ILT Series

Class	Name	Description
1##	Provisional	Request received, processing the request
	100 trying	
2##	Success	Message received, understood, and accepted
	200 ok	
3##	Redirection	Further action needs to be taken to complete the request
	301 moved permanently	
4##	Client Error	Request contains bad syntax or cannot be fulfilled
	400 bad request	
5##	Server Error	Server failed to fulfill the request
	500 server internal error	
6##	Global Failure	The request cannot be fulfilled by any server
	600 busy everywhere	

Figure 3.

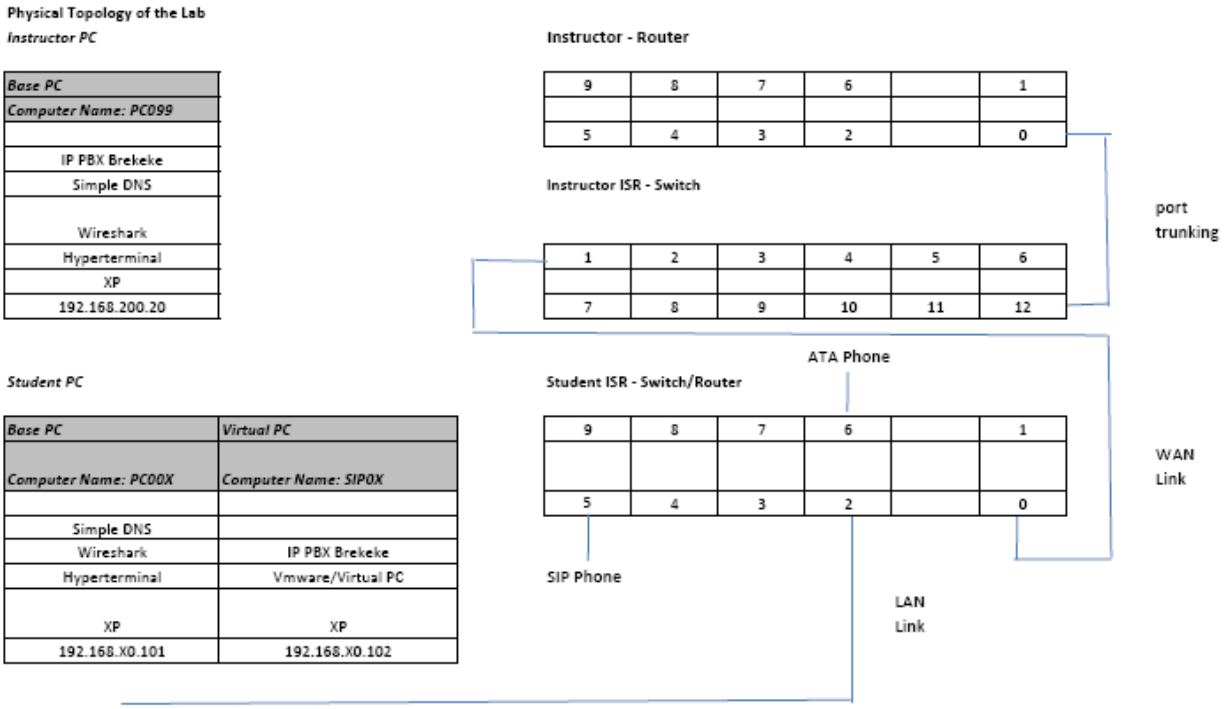
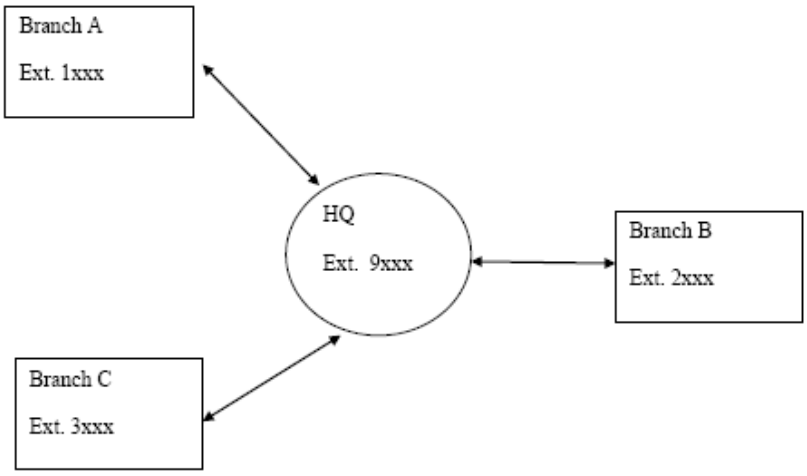


Figure 4.



NOTES

Developing Interpersonal Skills for Successful IT Management: Design of a Graduate Communication Course

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With the changing economy and more competitive job market facing information technology (IT) graduates, the IT curriculum must develop the skills that assure job placement and success. For graduates seeking IT management positions, the needed skill set is enlarged to include not only technical skills but also business, management, and communication skills (Bureau of Labor Statistics, 2010).

Background

For decades research studies have shown that employers seek students with superior interpersonal skills—including written and oral communication and team skills (Aasheim, Li, & Williams, 2009; Aken & Michalisin, 2007; Bailey & Mitchell, 2006-2007; *Downey*, McMurtrey, & Zeltmann, 2008; Havelka, & Merhout, 2009; Lee, 2005; Litecky, Prabhakar, Aken, & Arnett, 2009; Yew, 2008). In quoting a practitioner, Ehie (2002) identified a common view regarding the need for developing strong soft skills in IT programs: "We can train our new MIS hire on the technical skills, but it is very difficult to teach him or her interpersonal and communication skills."

The 2010-11 edition of *the Occupational Outlook Handbook* projected the employment of computer and information systems managers to increase 17 percent from 2008-2018; this projected growth exceeds the average projected growth for all occupations (Bureau of Labor Statistics, 2010). The report indicated that employers prefer applicants with a graduate degree for this position. In addition, employment prospects are best for graduates with good communication skills and developed understanding of business knowledge and processes. Most published research focuses, however, on developing undergraduate IT curricula and does not indicate specific curricula for developing soft skills in graduate IT programs, the focus of this research.

Purpose of the Study

This research study analyzed student evaluations of a graduate communication course designed to develop interpersonal skills needed by IT managers. The course was designed based on research which consisted of interviews with IT managers in a metropolitan area of a southern state and a subsequent survey of IT managers in the area investigating the value they place on the development of interpersonal skills for IT managers (Mitchell & Crawford, 2010). The graduate communication course focused on developing written and oral communication skills in addition to the ability to apply theories of interpersonal and organizational communication in the workplace as reflected in the following course topics: ethics, nonverbal communication, organizational culture, crisis management, generation issues, persuasion, and immediacy.

Course Design

The graduate communication course was developed incorporating the following learning modules:

- Communication for Business Managers
- Managerial Writing
  - Correspondence (direct, indirect, persuasive)
  - Short Reports
  - RFPs, Proposals
- Business Presentations
  - Informative Presentations
  - Persuasive Presentations
  - Small Group Facilitation
  - Interviews
- Theories of Communication
  - Communication Ethics
  - Nonverbal Communication
  - Organizational Culture
  - Crisis Management
  - Generation Issues
  - Persuasion
  - Immediacy
- Technology and Communication
- IT-Related Communication Theories
  - Media Richness Theory
  - Theory of Media Synchronicity
- Communicating with Vendors/Suppliers

Course project focus: Social Media

The course was totally project-based, with no exams. The first day of class students were given all assignments; they were encouraged to design projects around the identified focus of Social Media to make

use of required research in multiple projects. Individual and team research, writing, and speaking assignments were incorporated.

Individual case analyses/correspondence. Assigned analyses of cases (short reports) and correspondence were based on assigned cases and readings. These assignments were the basis for reviewing effective business writing practices and correct rules of grammar and punctuation.

Individual speech/critique. Each student developed and presented an informative presentation (8-10 minutes). A PowerPoint supplement and a full-sentence outline were required. A self critique was submitted following the presentation (videotape of presentation available). An in-class practice session was required to receive credit for this assignment. Students were encouraged to select a topic related to social media for this research/presentation assignment.

Team case analysis/individual written report. A formal individual case analysis based on group analysis of a complex IT case was required. The case was a detailed description of the handling/mishandling of an IT crisis; focus was on communication and managerial issues rather than technical issues. The team used multiple communication media for information sharing, discussions, and issue analysis—face-to-face discussion supplemented by at minimum three additional media types, such as email, online chat, blog, wiki, and twitter. Based on this ongoing team analysis, each team member drafted his or her own analysis of the issues and summation of needed action; this final analysis, based on prior team activity, was an individual assignment and could thus differ in approach/content among team members. Documentation of the ongoing communications of the group (use of various media) was presented by each student as an appendix to the written case analysis.

Group analysis and presentation. Each team completed a corporate training video outlining policy on the approved use of Social Media for meeting identified objectives within the organization. A project focus and specific audience were identified; an actual or nonidentified organization was selected. Specifics of the project were negotiated in class. The class decision was to develop a presentation to be delivered to the management team of the organization providing steps for appropriately integrating the use of social media into the organization (for identified purposes). As part of the presentation, the training video, designed for training employees on appropriate social media use, was "rolled out."

Individual analysis of use of varied media as tools in varying business situations. Each student wrote an analysis of the team's experience in using multiple media types in analyzing the IT case. This analysis was based on Media Richness Theory and the Theory of Media Synchronicity.

The course consisted of many short in-class writing and speaking workshops. Corporate experts spoke to the class on these topics: Effective Communication Skills in the Workplace; Crisis Management (the gulf oil spill), Interpersonal Communication Issues Relating to Generations, and Developing External Stakeholder Relations. Knowing all course assignments, the students could question the speakers regarding information that related to their ongoing projects.

Student Satisfaction Assessment and Analysis of Findings

The class consisted of 29 students; 19 students completed the formal assessment of their reactions and satisfaction with the course design and content. Student evaluation of the course consisted of the following:

- Rating of the value of specific course topics to personal and career development.
- Ranking of specific course activities/components based on importance to personal and career development as a business professional/manager.
- Extent to which the course changed business writing skills.
- Extent to which the course changed business speaking skills.
- Rating of invited speakers.

Data were analyzed based on students' degree programs (MS in MIS versus MBA) and years of work experience.

Student demographics. Eleven of the respondents were MBA students; seven were MS in Management Information Systems majors. These respondents overall had the following years of experience: less than 2 years, 2 (11%); 2-5 years, 5 (28%); 6-10 years, 6 (33%); and over 10 years, 5 (28%). The years of experience of the respondents (over 60 percent have 6 or more years of experience) adds validity to their assessment of the relevance of the course content/design.

Value of course topics. The students were asked to rate specific topics regarding value to their personal and career development. As show in Table I, presentation skills were rated highest, with written communication activities the lowest. Considering the high ratings (3.5 or greater out of 5) of all topics except number 14 ("study request for proposals/technical specifications"), however, the students did value the combination of course topics. When asked to rate the value of the topics to their personal and career development as a business professional/manager, the ratings were similar, as show in Table II. Three items having different relational ratings are the following: (1) "present proposal presentation to nontechnical audience (social media integration)"—the students may feel that managers overall do not often have this responsibility; (2) "study effective persuasion techniques"—the students feel managers need this skill; (3) "compose correspondence, memos"—the students feel managers need this skill.

Improvement of writing and speaking skills. Students were asked to indicate the extent to which their writing and speaking skills had improved in the course using a scale of 1 to 5, with 1 indicating "no improvement"; 2, "little improvement"; 3, "some improvement"; 4, "much improvement"; and 5, "extensive improvement." The mean response for the improvement of writing skills was 3.67; for speaking skills, 3.33. When asked how the course could have been improved to help further develop writing skills, a consistent response was to increase the length of the course (the course was offered over a five-week period) or offer multiple courses. Regarding improving the course speaking component, students recommended incorporation of micro speeches of 1 minute to provide more practice and to provide more in-class practices with class critiques.

Evaluation of other course components. Students rated the value of invited speakers on a scale of 1 to 5, with 1 indicating "no relevance"; 2, "limited relevance"; 3, "some relevance"; 4, "much relevance"; 5, "extensive relevance." The overall mean rating of speakers was 4.08. The value of the team case analysis (using various media types for communication) received a mean rating of 3.22 (3.57 for MS in Management Information Systems students alone), and the value of the study of media synchronicity to understanding how and when to use social media to accomplish business objectives received a mean rating of 3.44 (3.71 for MS in Management Information Systems students alone), both using a scale of 1 to 5, with 1 indicating "no value"; 2, "little value"; 3, "some value"; 4, "much value"; and 5, "extensive value."

Comments relating to improving the course related to expanding the course to three nights a week rather than two and to limit the number of topics included in the course. To give more concrete instructions/guidance for assignments was mentioned a number of times, though the assignments were purposely vague to allow teams to themselves move from problem to solution with the team-developed path to reach the end.

Recommendation of the course. When asked if they would recommend the course to another graduate student, 11 (61%) said, "definitely"; 4 (22%) said, "maybe"; 3 (17%) said, "no." All MS in Management Information Systems students said, "definitely."

Conclusion

A number of challenges were faced in developing and delivering this course:

- The course is a requirement in a master's program in MIS; however, MBA students elect the course. Thus topics of discussion and cases used had to relate to IT topics while focusing on interpersonal communication rather than technical issues.
- Students varied extensively in their communication skills, considering the range of ages and cultures represented in the program.
- This offering of the course was in the summer, with only five weeks (10, 3.45 hour sessions).
- The goal of the course is to increase the knowledge base of interpersonal and organizational communication while developing specific communication skills.
- Few teaching materials are available for a skills-based graduate communications course; they are basically nonexistent for an IT-based course.

Yet student enthusiasm in the course was extremely high; comments on the assessment included statements such as, "the course was one of the best I have had" and "the course structure was what a graduate course should be."

References

Aasheim, C. L., Li, L., & Williams, S. (2009). Knowledge and skill requirements for entry-level information technology workers: A comparison of industry and academia. *Journal of Information Systems Education*, *20*(3), 349-356.

Aken, A., & Michalisin, M. D. (2007). The impact of the skills gap on the recruitment of MIS graduates. *Proceedings of the 2007 ACM SIGMIS CPR*, USA, 105-111.

Bailey, J., & Mitchell, R. (2006-2007). Industry perceptions of the competencies needed by computer programmers: Technical, business, and soft skills. *Journal of Computer Information Systems*, *47*(2), 28-33.

Bureau of Labor Statistics (2010). Computer and information systems managers. *Occupational Outlook Handbook, 2010-11 Edition*. Retrieved September 11, 2010, from http://www.bls.gov/oco/ocos258.htm

Downey, J. P., McMurtrey, M. E., & Zeltmann, S. M. (2008). Mapping the MIS curriculum based on critical skills of new graduates: An empirical examination of IT professionals. *Journal of Information Systems Education*, *19*(3), 351-363.

Ehie, I. C. (2002). Developing a management information systems (MIS) curriculum: Perspectives from MIS practitioners. *Journal of Education for Business, 77*(3), 151-158.

Havelka, D., & Merhout, J. (2009) Toward a Theory of Information Technology Professional Competence. *The Journal of Computer Information Systems*, Retrieved September 11, 2010, from http://www.allbusiness.com/education-training/curricula/14060625-1.html

Lee, C. K. (2005). Analysis of skill requirements for systems analysts in Fortune 500 organizations. *Journal of Computer Information Systems*, *45*(3), 12-23.

Litecky, C., Prabhakar, B., Aken, A., & Arnett, K. (2009). Skills in the MIS job market. *Proceedings of the Fifteenth Americas Conference on Information Systems*, USA, 6 pp.

Mitchell, R., & Crawford, M. (2010, October). Interpersonal skills vital for successful information technology management. Paper presented at the meeting of the Association for Business Communication, Chicago, Illinois.

Yew, B. (2008). A Perspective on a Management Information Systems (MIS) Program Review. *Journal of Information Technology Education*, *7*, 300-312.

Table I - *Value of Topics to Personal and Career Development*

Topic	Mean Rating
1. design effective media (PowerPoint slide)	4.39
2.5 present informative presentation/training (individual presentation)	4.28
2.5 use presentation media (PowerPoint)	4.28
4. present proposal presentation to nontechnical audience (social media integration)	4.17
5. deal with sensitive communication issues	4.11
6. analyze choice/use of varying media types	3.89
7.5 foster a positive culture of team decision making	3.83
7.5 study effective persuasion techniques	3.83
9. review rules of grammar and punctuation	3.78
10. compose correspondence, memos	3.72
11. apply conflict resolution skills in the workplace	3.67
12. develop proposals/reports for nontechnical decision makers	3.50
13. review system of documentation (APA)	3.44
14. study request for proposals (RFPs)/technical specifications	2.89

Table II - *Importance of Topics to Personal and Career Development as a Business Professional/Manager*

Mean Ranking	Topics
1.	design effective media (PowerPoint slide)
2.	use presentation media (PowerPoint)
3.	study effective persuasion techniques
4.	present informative presentation/training (individual presentation)
5.	compose correspondence, memos
6.	deal with sensitive communication issues
7.	foster a positive culture of team decision making
8.	apply conflict resolution skills in the workplace
9.	analyze choice/use of varying media types
10.	present proposal presentation to nontechnical audience (social media integration)
11.	review rules of grammar and punctuation
12.	develop proposals/reports for nontechnical decision makers
13.	review system of documentation (APA)
14.	study request for proposals (RFPs)/technical specifications

NOTES

Examining the Value of Informal Current Events Discussions in Online Graduate MIS Classes

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Introduction

Teaching the graduate MIS course can be a challenge. Teaching online courses can be a challenge. Teaching the graduate MIS course online presents unique challenges. The proposed paper will present the experience of three faculty from two regional universities in using current news and e-zine articles to increase participation and add relevance to the online graduate MIS experience. Data gathered from students will be presented.

Literature Review

A brief review of relevant literature follows, focusing on effectiveness of online discussion board use in relation to constructivist learning, student learning perceptions and performance during required participation, and student learning perceptions during optional participation.

Constructivist Learning

Significant research has been conducted to define online discussion board components that can promote constructivist learning. Such learning fosters students being the major architects of their own learning experiences, with the instructor taking on the role of a guide in that endeavor. Instructors should consider: (a) establishing a learning-conducive environment, (b) setting ground rules, (c) guiding threaded discussions, (d) discussing relevant topics, (e) focusing on Bloom's cognitive domain areas of analysis, synthesis, and evaluation, (f) recognizing student efforts, (g) being aware of nonparticipation, (h) inspiring participation, (i) fostering reflection, and (j) using teaching strategies that help students summarize fundamental concepts (e.g., Cole & Kritzer, 2009; Comeaux, 2002; Levine, 2007; Palloff & Pratt, 2005; Salmon, 2000; Waterhouse, 2005).

Learning Perceptions and Performance – Required Participation

Other areas of research include assessing required online discussion board effectiveness in terms of student learning perceptions and performance. Several student learning perception studies have been conducted with surveys, indicating both positive and negative correlations (e.g., Hiltz, Coppola, Rotter, Turoff & Benbunan-Fich, 2000; Kay, 2006; Krentler & Willis-Flurry, 2005; Picciano, 2002; Schallert *et al*, 2003; Swan, 2002). Fewer studies have been conducted in relation to correlating discussion board use with student performance, also showing mixed results (e.g., Mills, 2009; Young, 2006).

Learning Perceptions – Optional Participation

Of particular interest to the authors, is the online discussion board effectiveness in terms of student learning perceptions where student participation is optional. It appears that little formal research has been done in this area. In general, students may have tendencies to avoid discussions that are not required. On the other hand, if student participation increases, this can indicate some degree of discussion board effectiveness (e.g., Gill, 2006).

Methodology

Over the course of two semesters, the MIS faculty implemented the concept of the Coffee House Discussion Board. The Coffee House Discussion Board is a non-credit, optional discussion board as opposed to six mandatory discussion boards required for the course. The instructors post a current news article or one from an e-zine on a topic of interest. These articles range from current events in information systems (business and scientific), how-to's on productivity software, ethical issues raised by information systems, or fun humorous articles. The topics were often ones not found in the text. The instructors noticed quickly that the Coffee House discussions garnered more participation and lively debate than the required course discussions.

Initial student comments on the value of these discussions include:

Since starting this class and reading the coffee house discussion board I have had numerous conversations with co-workers and family regarding IT. The articles are interesting and I will comment occasionally on ones that are a particular interest to me.

Personally, I like the Coffee House discussion board. It's nice to see what other people think, and have a

place to discuss things that are of a more diverse and abstract nature than the typical textbook content.

Hopefully you will continue the coffee house. I think it is of huge value to discuss related topics or topics more in dept, than just working on the subject in the book. I have gained important personal and subject related knowledge from any type of discussion board in any course I take. On a side note, the discussion boards do take up a lot of time, for students but also instructors. I think the effort pays off for both parties.

At the end of the course, students were surveyed to determine their perception on the value of the Coffee House Discussions. Preliminary results of the survey show 100% of students thought the Coffee House was interesting; 94% felt that the articles increased their understanding of information systems, and 71% indicated that the Coffee House participation changed how they felt about information systems. In addition, 60% of the students indicated that the information gained from the Coffee House discussions was shared with others at work. In terms of the impact of the discussions on life outside of class, 64% of students reported that the Coffee House discussions have changed current or future decisions in their personal life, while 39.5% indicated that the discussions impacted current or future discussions at work.

The authors propose to present the method of using informal class discussions to increase the relevance and interest of information systems content for online graduate MIS courses. The complete results of the student survey will be presented.

References

Cole, J. E., & Kritzer, J. B. (2009). Strategies for success: Teaching an online course. *Rural Special Education Quarterly, 28*(4), 36-40.

Comeaux, P. (2002). *Communication and collaboration in the online classroom: Examples and applications*. Boston, MA.: Anker Publishing Company.

Gill, G. (2006). Asynchronous discussion groups: A use-based taxonomy with examples. *Journal of Information Systems Education, 17*(4), 373-383.

Hiltz, S. R., Coppola, N., Rotter, N., Turoff, M. & Benbunan-Fich, R. B. (2000). Measuring the importance of collaborative learning for the effectiveness of ALN: a multi-measure, multimethod approach. *Journal of Asynchronous Learning Networks, 4*(2), 103-125.

Kay, R. (2006). Developing a comprehensive metric for assessing discussion board effectiveness. *British Journal of Educational Technology, 37*(5), 761-783.

Krentler, K. A., & Willis-Flurry, L. A. (2005). Does technology enhance actual student learning? The case of online discussion boards. *Journal of Education for Business, 80*(6), 316-321.

Levine, J. (2007). The online discussion board. *New Directions for Adult and Continuing Education, 113*, 67-74.

Mills, J.D. (2009). Developing statistics learning at a distance using formal discussions. *2009 Proceedings of the European Computing Conference, 27*(2), 359-366.

Palloff, R. M. & Pratt, K. (2005). *Collaborating online: Learning together in community*. San Francisco, CA: Jossey-Bass.

Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks, 6* (1), 21-40.

Salmon, G. (2000). *E-moderating: The key to teaching and learning online*. London: Kogan Page.

Schallert, D. L., Reed, J. H., & D-Team, T. (2003). Intellectual, motivational, textual, and cultural considerations in teaching and learning with computer-mediated discussion. *Journal of Research on Technology in Education, 36*(2), 103-118.

Swan, K. (2002). Building communities in online courses: the importance of interaction. Educa*tion, Communication and Information, 2*, 1, 23-49.

Waterhouse, S. (2005). *The power of elearning: The essential guide for teaching in the digital age*. Boston, MA: Pearson Education.

Young, S. (2006). Student views of effective online teaching in higher education. *The American Journal of Distance Education, 20*(2), 65-77.

Financial Decision Making and Competitive Strategy
Decision Theory and Competitive Strategy

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Introduction

Decision making can be regarded as an outcome of mental processes (cognitive process) leading to the selection of a course of action among several alternatives. (Verma, 2009) As Taylor (2010, p. 527), aptly phrased it, "Decision situations can be categorized into two classes: situations in which probabilities cannot be assigned to future occurrence (certainty) and situations in which probabilities can be assigned (uncertainty)" According to Samuelson & Marks (2003), "Decision making lies at the heart of most important business and government problems" (p. 1). For example, decision-making in business can be time-critical parts of good business. But how is a good decision made? Having good information, experience in interpreting information, and seeking the views and expertise of other people may lead to good decisions. There are many tools that can be apply to different types of business decisions. The types of business decision-making may include: (a) programmed (b) non-programmed, (c) tactical, (d) strategical, and (e) operational decisions. There are only two possible outcomes of decisions: good or bad results. The decision makers must select the criterion or combination of criteria that best suits their needs. This paper discusses business decisions using financial ratios to analyze financial statements involving a company's liquidity, profitability, and solvency.

Game Theory

The theory of games as a way of modeling problems with one or more decision-makers involved, originated at the end of the Second World War. During the same time, new mathematical techniques were being invented that influenced decision-making. Oskar Morgenstern and John Von Neumann (1944) launched the discipline of game theory. Game theory applied to economics, international relations, and conflict studies.(Thomas, 1984, Samuelson & Marks, 2003) Dempster-Shafer is another theorist who used a mathematical theory of evidence, that combines evidence from different sources and arrives at a degree of belief that takes into account all the available evidence. The Dempster-Shafer theory is well known as a probability theory that can effectively model uncertainty.

Steps in Decision Making

The process of decision making can be broken down into six basic steps: defining the problem, determining the objective, exploring the alternatives, predicting the consequences, making a choice, and performing sensitivity analysis. (Samuelson & Marks, 2003, p. 7) These processes can be modeled after the basic assumption behind individual models of decision-making (termed rational or irrational). "The rational model of human behavior assumes that people engage in basically consistent, rational, value-maximizing calculations" (Laudon & Laudon, 2002, p. 83). "The management's primary goal is to maximize the value of the firm. The firm's value is the present value of its expected future profit" (Samuelson & Marks, 2003, p. 15). Value maximization (valuation principle) is a compelling prescription concerning how managerial decisions should be made. It shows how to make the costs and benefits of a decision comparable so that the firm can weigh them properly. (Berk, DeMarzo, & Harford, 2010, Samuelson & Marks, 2003). "Experience, judgment, common sense, intuition, and rules of thumb all make potential contributions to the decision-making process. However, none of these can take the place of sound analysis" (Samuelson & Marks, 2003)

Siegel & Shim (2000) state that, "A financial ratio is analytical interpretation, computed only if the relationship between accounts or categories of account has significance. The financial ratio provides the accountant with clues and symptoms of underlying financial conditions. To be meaningful, a given financial ratio of a company for a given year must be compared to (1) prior years, to examine the trend, (2) the industry norm, and (3) competing companies." (p. 180).

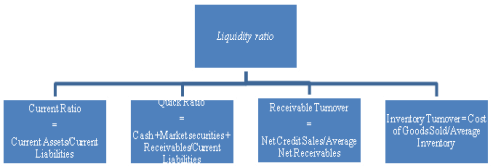
A financial statement report contains financial information about an organization. The financial statements include balance sheet, income statement, and statement of changes in financial position. A financial statement analysis is used by interested parties such as investors, creditors, and management to evaluate the past, current, and projected conditions and overall performance of the firm. (Weygandt, Kimmel, & Kieso, 2010 & Siegel & Shim, 2000)

According to Siegel & Shim (2000), when using the financial ratios, a financial analyst makes two types of comparisons:

1. Industry comparison. The ratios of a firm are compared with those of similar firms or with industry averages to determine how the company is faring relative to its competitors.
2. Trend analysis. An analysis of a firm's present ratio is compared with its past and expected future ratios to determine whether the company's financial condition is improving or deteriorating over time. (p. 181)

Given below is a list of widely used financial ratios:

Decision Making: Liquidity Ratio

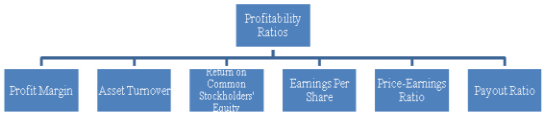


Liquidity is the ability of current assets to meet current liabilities when due. The degree of liquidity of an asset is the period of time anticipated to elapse until the asset is realized or otherwise converted into cash. A liquid company has less risk of being unable to meet debt than an illiquid one. Furthermore, a liquid business generally has more financial flexibility to take on new investment opportunities and can immediately convert into cash without significant loss of value (Siegel & Shim, 2000, p. 262).

Decision Points

- Current ratio measures short-term debt-paying ability. Current ratio analysis is one of the most commonly used tools for measuring a company's liquidity" (Boone & Kurtz, 2010, p. 539). Lenders look closely at liquidity rates because they indicate a company's ability to pay its obligations and meet unexpected needs for cash (Weygandt, Kimmel, & Kieso, 2010, p. 706). The current ratio is calculated by dividing the current assets of the company by the current liabilities for the same accounting period (Boone & Kurtz, 2010, p. 539).
- Quick ratio indicates the ability of a company to meet its short-term liquidity. The quick ratio is more conservative than the current ratio, a more well-known liquidity measure, because it excludes inventory from current assets. Inventory is excluded because some companies have difficulty turning their inventory into cash. In the event that short-term obligations need to be paid off immediately, there are situations in which the current ratio would overestimate a company's short-term financial strength. (Investopedia, 2010)
- Receivable turnover indicates a company's activity ratio, and it is designed to measure how efficiently a company uses its assets. An accounting firm may use it to quantify the company's effectiveness. By maintaining accounts receivable, companies are indirectly extending interest-free loans to their clients. A high ratio implies either that a company operates on a cash basis or that its extension of credit and collection of accounts receivable is efficient. A low ratio implies the company should re-assess its credit policies in order to ensure the timely collection of imparted credit that is not earning interest for the firm. (Investopedia, 2010)
- Inventory turnover measures the number of times, on average, the inventory is sold during the period. Its purpose is to measure the liquidity of the inventory. (Weygandt, Kimmel, & Kieso, 2010) A low turnover implies poor sales and, therefore, excess inventory. A high ratio implies either strong sales or ineffective buying. High inventory levels are unhealthy because they represent an investment with a rate of return of zero. It also opens the company up to trouble should prices begin to fall. (Investopedia, 2010)

Profitability Ratios



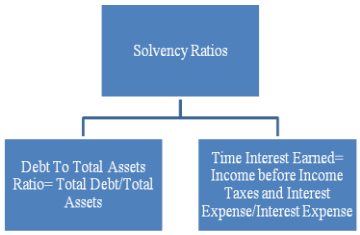
Srivastava & Yadav (2010) state that "profitability ratios are designed for the evaluation of the company's operational performance." (p.31) In addition, Weygandt, Kimmel, & Kieso (2010) contend that lack of of operating success, affects the company's ability to obtain debt and equity financing. The profitability ratios yield an idicator of the company's efficiency in using capital committed by shareholders and lenders. (Srivastava & Yadav, 2010) It also affects the company's liquidity position and the company's ability to grow. (Weygandt, Kimmel, & Kieso, 2010)

Decision Points

Both creditors and investors use profitability ratios to evaluate a company's power and the utimate test of management's operating effectiveness. (Gombola & Ketz, 1983, Srivastava & Yadav, 2010, and Weygandt, Kimmel, & Kieso, 2010)

- Profit margin indicates the percentage of each dollar of sales that is yielded in net income; asset turnover measures how efficiently a company uses its assets to generate sales.
- Return on assets indicate the percentage a company generates on its investments and shows how companies use it to decide whether or not to initiate a new project. (Investopedia, 2010)
- Return on common stockholder's equity is widely used, and indicate how many dollars of net income the company earned for each dollar invested by the owners. (Weygandt, Kimmel, & Kieso, 2010)
- Earnings per share (EPS) indicates a company's net income earned on common stock. It is used in determining a share's price, and it is also a major component used to calculate the price-to-earning valuation ratio. EPS is usually derived from the last four quarters (trailing P/E), but sometimes it can be taken from the estimates of earnings expected in the next four quarters (projected or forward P/E). A third variation uses the sum of the last two actual quarters and the estimates of the next two quarters. (Investopedia, 2010)
- Price earnings ratio (P-E) indicates the market price of each share of common stock to the earning per share. P/E ratio doesn't tell the whole story by itself. It's usually more useful to compare the P/E ratios of one company to other companies in the same industry, to the market in general, or against the company's own historical P/E. It would not be useful for investors using the P/E ratio as a basis for their investment to compare the P/E of a technology company (high P/E) to a utility company (low P/E), as each industry has much different growth prospects. (Investopedia, 2010)
- Payout ratio measures the percentage of earnings distributed in the form of cash dividends. (Weygandt, Kimmel, & Kieso, 2010) The payout ratio provides an idea of how well earnings support the dividend payments. More mature companies tend to have a higher payout ratio. In the U.K. there is a similar ratio, which is known as dividend cover. It is calculated as earnings per share divided by dividends per share. (Investopedia, 2010)

Solvency Ratios



Solvency ratios indicate the company's ability to survive over a long period of time. (Weygandt, Kimmel, & Kieso, 2010, p. 714) The solvency ratio measures the size of a company's after-tax income; excluding non-cash depreciation expenses, as compared to the firm's total debt obligations. It provides a measurement of how likely a company will be to continue meeting its debt obligations. Acceptable solvency ratios will vary from industry to industry, but as a general rule of thumb, a solvency ratio of greater than 20% is considered financially healthy. Generally speaking, the lower a company's solvency ratio, the greater the probability that the company will default on its debt obligations. (Investopedia, 2010)

Decision Points

- Debt to total assets ratio indicates the percentage of total assets that creditors provide and the degree of leverage of a company along with the potential risks the company faces in terms of its debt load. The higher the percentage of debt to total assets, the greater the risk that the company may be unable to meet its maturing obligations. (Weygandt, Kimmel, & Kieso, 2010, p. 714 and Investopedia, 2010) A debt ratio of greater than 1 indicates that a company has more debt than assets, while, a debt ratio of less than 1 indicates that a company has more assets than debt. Used in conjunction with other measures of financial health, the debt ratio can help investors determine a company's level of risk. (Investopedia, 2010)
- Time interest earned indicates the company's ability to meet interest payments as they come due. (Weygandt, Kimmel, & Kieso, 2010) It is an indicator of whether a company is running into financial trouble. A high ratio means that a company is able to meet its interest obligations because earnings are significantly greater than interest obligations. Moreover, a high ratio can mean that a company has an undesirably low level of leverage or pays down too much debt with earnings that could be used for other investment opportunities to get higher rate of return. (CFO, 2010)

Conclusion

Decision making can be regarded as an outcome of mental processes (cognitive processes) leading to the selection of a course of action among several alternatives. Decision situations can be categorized into two classes: situations in which probabilities cannot be assigned to future occurrence (certainty), and situations in which probabilities can be assigned (uncertainty). According to Samuelson & Marks (2003), "Decision making lies at the heart of most important business and government problems."

References

Berk, J., DeMarzo, P., & Harford, J. (2010). *Fundamentals of corporate finance.* Upper Saddle River, NJ: Prentice Hall.

CFO. (2010, November 9). *Time interest earned ratio analysis: Strategic CFO.* Retrieved February 8, 2011, from Strategic CFO Web site: http://www.wikicfo.com/Wiki/Default.aspx?Page=Ratio%20Analysis%20Time%20Interest&NS=&AspxAutoDetectCookieSupport=1

Gombola, M. J., & Ketz, J. E. (1983, January). A note on cash flow and classification patterns of financial ratios. *The Accounting Review*, p. 105.

Investopedia. (2010). *Evaluating A Company's Management: Investopedia.* Retrieved November 3, 2010, from Investopedia Web site: http://www.investopedia.com/articles/02/062602.asp

Laudon, K. C., & Laudon, J. P. (2002). *Management information systems.* Upper Saddle River, NJ: Prentice Hall.

Pratt, P. J., & Adamski, J. J. (2009). *Database management.* Mason, OH: Cengage Learning.

Samuelson, W. F., & Marks, S. G. (2003). *Managerial economics.* New York, NY: John Wiley & Sons, Inc.

Srivastava, S. S., & Yadav, R. A. (2010). *Management and monitoring of industrial sickness.* Mohan Garden, New Delhi: Concept Publishing Company.

Taylor, B. W. (2010). *Introduction to management science.* Upper Saddle River, NJ: Prentice Hall.

Thomas, L. C. (1986). *Games, theory and applications* . Chichester, London: Ellis Horwood/John Wiley.

Verma, D. (2009). *Decision making style: Social and Creative dimensions.* New Delhi: Global India Publications.

Weygandt, Kimmel, & Kieso. (2010). *Financial accounting.* Danvers, MA: John Wiley & Sons, Inc.

Incorporating Innovative Technology to Transform Teaching and Learning Corporate Finance

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Abstract

The authors examined the impact of using an online homework management system on students' performance in a junior-level corporate finance course. Relative to students who used conventional homework assignments, students doing their homework via an online system showed significantly improved course grades.

Keywords: *Online Homework Systems, Teaching Technology, MyFinanceLab*

Introduction

As students and instructors have increased their use of computers in both personal and professional capacities, a market for online homework applications has developed. Textbook publishers have presented instructors with options for using the systems as class supplements. There are varying opinions about the helpfulness of the systems with regard to student engagement, understanding, student attitudes, and impact on performance.

Opponents have expressed concern that online systems might reduce interpersonal skills and discourage creativity (Oppenheimer, 2003). They believe that a computerized system cannot adequately substitute for the student-teacher interaction provided by traditional systems.

Proponents maintain that online homework systems offer opportunities to increase student engagement and understanding of material. Students have the opportunity to do homework and receive immediate feedback at any time. Students report that they spend more time studying outside of class (Allain and Williams, 2006) and have favorable opinions about using online homework systems (Butler and Zerr, 2005; Lee et. al., 2010; Sagarra and Zapata (2008); Smolira (2008), Zerr (2007)). Instructors have found that students are better prepared for class (Grove, 2002) and are more likely to do homework (Lenz, 2010; Zerr, 2007) when online homework systems are used. However, some students are dissatisfied with the amount of time required to use the systems (Sagarra and Zapata, 2008).

Students perceive that they gain a better understanding of the material when using an online system relative to a traditional homework system (Lee et. al., 2010; Smolira, 2008, Zerr, 2007). The empirical results are mixed. Allain and Williams (2006) found no significant difference in understanding or test scores for their astronomy students. Lee et. al. (2010) determined that the use of an online homework system vs. a traditional system did not significantly improve students' understanding of economics; however, the use of an online homework system didn't adversely affect learning. Lenz's (2010) mathematics students earned higher homework scores when they used web-based homework systems; however, test scores were not significantly different between the two groups. Cheng et. al. (2004) found an increase in understanding of physics concepts that was statistically significant for students who used an online homework system in physics classes. Sagarra and Zapata (2008) found that their students' Spanish grammar scores increased significantly through the use of the online system.

The purpose of this paper is to investigate the effect of using an online homework system in a junior-level corporate finance class on students' performance in the class. The impacts of homework system on homework grades, test grades, and course grades are explored.

Data

Homework grades, test grades, and course grades for students in one instructor's junior-level corporate finance classes are used. During the fall 2005, spring 2006, and spring 2007 semesters the students did homework the traditional pencil and paper way and handed it in to be graded. A total of 83 students were in this traditional homework group (TH). During the fall 2008, spring 2009, and fall 2009 semesters students did homework via the MyFinanceLab (MFL) online homework system. MFL offers immediate feedback on the accuracy of answers and links for examples, textbook pages, and e-mailing the instructor. It also provides iterative practice by offering access to algorithmic problems. Students can request a problem that is similar to the one just completed and receive a different set of numbers to

work with as the redo the problem. A total of 83 students were in the MFL homework group.

For each group data were collected for homework average, test average, and final course grade. The level and the variability of each item are determined, and the correlations among the items are examined.

Methodology

The students were assigned to a treatment group based on whether they did traditional homework (TH) or online homework using MyFinanceLab (MFL). Each student's homework scores, test scores, and course grade were collected. Average homework score and average test score was calculated for each student. Two-tailed t-tests were performed for differences in means between the two groups' homework scores, test scores, and course grades.

Standard deviations of homework scores, test scores, and course grades were calculated for the TH group and the MFL group. The standard deviation is used as a measurement of variability for the associated item.

For each group, correlations were calculated between homework scores and test scores and also between homework scores and course grades.

Results

The results for homework scores are shown in Table 1 below. The homework averages were significantly higher for the traditional homework (TH) group than for the online homework (MFL) group. There was more variability among homework scores for the TH group as measured by the standard deviation (SD) of the scores. Students appear to be more consistent in homework performance when the online homework system is used.

The fact that students have significantly lower homework scores when they use MFL probably reflects the fact that every single problem that is assigned is graded and students are held responsible for doing all of their homework. This is not necessarily a bad thing!

Table 1
Homework Scores

	TH	MFL
n	83	83
Average	87.27	86.80
SD	17.28	15.73
t-statistic	-3.035	
p-value	0.0028	

Table 2 shows the results for test scores. The students who used MFL performed better on tests, although not significantly. The standard deviation of the test scores was lower for the MFL group, which indicates more consistency in performance. Note that although students using the online homework system achieved lower homework scores, their test scores were higher.

Table 2
Test Scores

	TH	MFL
n	83	83
Average	71.60	74.34
SD	17.28	9.97
t-statistic	1.539	
p-value	0.1257	

Course grade results are represented in Table 3. Students using MFL had significantly higher course grades with less variability. The magnitude of the difference is 3.94%, which could make a difference in the letter grade the student receives.

Table 3
Course Grades

	TH	MFL
n	83	83
Average	73.17	77.10
SD	12.60	9.82
t-statistic	2.245	
p-value	0.0261	

Further analysis of the relationships among homework (HW) scores, test scores, and course grades is provided by an examination of the correlations among these items. Table 4 shows the correlations.

Table 4

Correlations among Measured Items

	TH	MFL
HW & Tests	0.491406	0.689842
HW & Course Grade	0.588927	0.757336
Tests & Course Grade	0.990627	0.984392

There is a higher correlation between homework grades and test grades when the online homework system is used. Students are more apt to do homework with MFL since every assignment counts toward their grade. Although the homework grades are slightly lower, the payoff is higher when MFL is used.

The same holds true for the relationship between homework grades and course grades. Students who use the online homework system earn course grades that represent the effort put forth on homework and the understanding of the material gained by doing the homework.

The correlation between test scores and course grades is understandably very high since, in these classes, approximately 85% of the course grade is determined by test scores. In this sense, this particular correlation is not especially meaningful.

Conclusions

It appears that using an online homework system is useful in encouraging students to complete homework assignments and that students earn a reward that is commensurate with their efforts in doing homework. Although students' homework scores are slightly lower when an online homework system is used, there is less variability in the scores and course grades are significantly higher.

Further research to extend the study to include more students is a possibility. Variables such as time spent on assignments, homework system tools used, and their impact on success in the course might also be investigated. The goal would be to provide insight into which factors are most effective in helping students understand course material.

References

Allain, R., and T. Williams. The Effectiveness of Online Homework in an Introductory Science Class, Journal of College Science Teaching, 2006, Vol.35(6), p.28-30.

Butler, M.B., and R.J. Zerr. The Use of Online Homework Systems to Enhance Out-of-Class Student Engagement, International Journal for Technology in Mathematics Education, 2005, Vol.12(2), p.51-58.

Cheng, K. K., B. A. Thacker, R. L. Cardenas, and C. Crouch. Using an Online Homework System Enhances Students' Learning of Physics Concepts in an Introductory Physics Course, American Journal of Physics, 2004, Vol. 72, p. 1447.

Grove, K., Using Online Homework To Engage Students in a Geoscience Course for General Education, Journal of Geoscience Education, 2002, Vol.50(5), p.566-74.

Lee, W., R.H. Courtney, and S.J. Balassi. Do Online Homework Tools Improve Student Results in Principles of Microeconomics Courses?, The American Economic Review, 2010, Vol. 100(2), p. 286-286.

Lenz, L., The Effect of a Web-Based Homework System on Student Outcomes in a First-Year Mathematics Course, Journal of Computers in Mathematics and Science Teaching, 2010, Vol.29(3), p.233-246.

Oppenheimer, T., The Flickering Mind: the False Promise of Technology in the Classroom and How Learning Can Be Saved, 2003, New York: Random House Publishing Group.

Sagarra, N., and G.C. Zapata, Blending classroom instruction with online homework: A study of student perceptions of computer-assisted L2 learning, ReCALL, 2008, Vol.20(2), p.208-224.

Smolira, J.C, Student Perceptions of Online Homework in Introductory Finance Courses, Journal of Education for Business, 2008, Vol.84(2), p.90-95.

Zerr, R., A Quantitative and Qualitative Analysis of the Effectiveness of Online Homework in First-Semester Calculus, Journal of Computers in Mathematics and Science Teaching, 2007, Vol.26(1), p.55-73.

NOTES

PERCEIVED OR REAL RISKS USING SMARTPHONES

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Introduction

Smartphones have blurred the line of capability usually prescribed to traditional telephones by their becoming the premier multi-tasking devices of today's world. Since current smartphones have their own dedicated operating system, Bluetooth capabilities, constant network connection, PC connectivity, and internet capability, smartphones are experiencing security risks just as computer systems have done for many years. This paper will examine the history of mobile technology and its integration into people's daily lives. Furthermore, smartphone capabilities will be investigated for their potential vulnerabilities due to lack of consumers' precautions and smartphone usage.

Review of Literature

According to Tom Farley (2005), "by the late 1980s, the American wireless industry began searching for a higher capacity system" (p. 30). The frontrunner seemed to be a time based, or time division multiple access (TDMA), technology. This digital system became IS-54. CDMA, code division multiple access, appeared to enter the market too late to have any foundation in the industry, but that would all change in time.

IS-54 became the official digital standard for the cellular network for America in 1990. With IS-54 an operator could "convert any of its analog voice channels to digital. Customers got digital service where available and analog where it wasn't" (Farley, 2005, p. 31). Then in 1991, Pacific Telephone decided to invest in Qualcomm, the company that developed CDMA. The investment paid dividends; in 1993, CDMA was approved as an alternative digital standard, and was called IS-95. This system, too, used a two mode system, digital when possible and analog otherwise. Farley (2005) noted, "In 1996 NextWave PCS launched the first American [CDMA/] IS-95 system and the next ten years might well be called the Triumph of CDMA" (p. 32). At first glance, it appeared that this new network would help with the ability to make calls from anywhere; but as Bi, Zysmann & Menkes (2001) noted, "a more profound feature is the significant improvement of its data and multimedia capabilities" (p. 110).
It is through the growth and application of the CDMA and GSM systems that allows the smartphone to be practical today, and as Bi, et al. (2001) state, "it is interesting to observe that these seemingly simple ideas have since revolutionized wireless communications" (p. 110). Finally, in 1996, the advent of the smartphone made its appearance with the Nokia Communicator 9000, which "had a QWERTY keyboard and built in word processing and calendar programs. Besides sending and receiving faxes, the 9000 could check email and access the internet in a limited way" (Farley, 2005, p. 32). Due to the increased functionality and its ability to connect to the internet, the smartphone has become vulnerable to viruses. D. Shih, Lin, Chiang, and M. Shih (2008) note that "the first computer virus that attacks mobile phones is VBS.Timofonica which was found on May 30, 2000" (p. 479).

Since viruses have now invaded smartphones, the first precaution consumers can take is educating themselves in the areas that a virus can infect the phone. These areas include multimedia messaging system (MMS), Bluetooth, internet, syncing/docking, and peripherals. MMS messages are sent over the provider's cellular network, typically virus free, to exchange media files. However, Töyssys and Helenius (2006) note that, "malicious software can spread via MMS messages by attaching a copy of itself and sending it to some device capable of receiving MMS" (p. 111). Cheng, Wong, Yang, and Lu (2007) reaffirm this by pointing out that "the most well-known virus of such a kind is *CommWarrior*" (p. 259). *Cabir*, the first smartphone virus, spread via Bluetooth (Töyssys, 2006, p. 111). However, a weakness of spreading the virus by the means of Bluetooth is that it must be in discoverable mode, which often times out, and the user must accept and install the incoming file. Similar to computers, smartphone users have the risk of downloading a virus from the internet that is masquerading as a game or some other application the user may find enticing. Since current smartphones are nearly always connected to the internet, it only amplifies the seriousness of the issue because it allows the virus to be in constant communication with the host. The *Crossover* virus was spread through syncing, when, "smartphones are connected to a computer in order to synchronize calendar events and new contacts," notes Cheng et al. (2007, p.260). However, for this type of attack to succeed, the user's computer first must be infected. The final way a smartphone can be infected is through peripherals or removable media.

This research indicates that with several possible infection methods, an anti-virus program for a consumer's smartphone seems like a wise choice. However, the program has the challenge of working within the capabilities of the smartphone while not hogging too many resources or draining battery life. It is perhaps due to these current limitations and drawbacks, that more consumers don't have an anti-virus program installed on their smartphone.

Purpose

The purpose of this paper is to examine the increased availability and use of smartphones and consumers' experience with real or perceived vulnerabilities and lack of precautions that lead to an increase in vulnerabilities. This will be determined through a survey evaluating smartphone usage, awareness, and concern.

Design of the Study

Students, faculty, and alumni of a mid-size Texas public university were asked to complete an anonymous online questionnaire. The questions covered demographic information and primarily included a 1 – 5 rating scale for the questions, with 1 being low and 5 being high. The survey questions include:

1. Demographic information
2. Do you have a smartphone?
3. How many years have you had a smartphone?
4. What operating system does your current smartphone run?
5. Have you ever, to your knowledge, had private information stolen due to smartphone usage?
6. How concerned are you about having private information stolen from your smartphone?
7. Are you aware of any smartphone viruses?
8. Do you use an anti-virus program on your smartphone?
9. How concerned are you about getting a virus on your smartphone?
10. Do you download apps on your smartphone?
11. Do you read the User Agreement license for apps you download?
12. What is your smartphone primarily used for?

Findings

The total number of respondents completing the online survey was 120. In some isolated cases, answers were left blank. The results of the administered survey questionnaire are summarized as follows:

Gender

Male	95 (48.5%)
Female	101 (51.5%)

Age

Under 18	1 (0.5%)
18-22	110 (56.1%)
23-29	38 (19.4%)
30-45	29 (14.8%)
46 or older	18 (9.2%)

Have a Smartphone?

Yes	120 (61.5%)
No	75 (38.5%)

Years Owning Smartphone

< 1 Year	24 (19.4%)
1-2 Years	51 (41.1%)
2-5 Years	40 (32.3%)
> 5 Years	9 (7.3%)

OS on Smartphone

Android	28 (23.3%)
iPhone OS	56 (46.7%)
Palm OS	2 (1.7%)
Blackberry	21 (17.5%)
Symbian OS	0 (0.0%)
Windows	8 (6.7%)
Other	6 (5.0%)

Private Information Stolen from Smartphone?

Yes	1 (0.8%)
No	119 (99.2%)

Concern of Private Information Stolen from Smartphone?

Not at all	11 (9.2%)
Not very	39 (32.5%)
Neutral	21 (17.5%)
Somewhat	30 (25.0%)
Very	19 (15.8%)

Aware of Smartphone Viruses?

Yes	12 (10.2%)
No	106 (89.8%)

Use an Anti-virus Program on Smartphone?

Yes	18 (15.4%)
No	99 (84.6%)

Concern of Getting Virus on Smartphone?

Not at all	14 (11.9%)
Not very	37 (31.4%)
Neutral	27 (22.9%)
Somewhat	28 (23.7%)
Very	22 (10.2%)

Download Apps on your Smartphone?

Yes	94 (80.3%)
No	23 (19.7%)

How Often Do You Read the User Agreement License for Apps?

Never	47 (40.5%)
Rarely	37 (31.9%)
Sometimes	15 (12.9%)
Often	9 (7.8%)
Always	8 (6.9%)

What is Your Smartphone Primarily Used for?

Personal	62 (53.4%)
Business	1 (0.9%)
Both	53 (45.7%)

The following significant responses were found:

Gender Regarding Concern of Having Private Information Stolen:
There were 58 male respondents, of which 20 (34.4%) answered to be at least somewhat concerned of having private information stolen. There were 62 female respondents, of which 29 (46.8%) answered to be at least somewhat concerned of having private information stolen. Based upon these responses, females are 12.4% more likely to be concerned regarding private information being stolen from their smartphones.

Gender Regarding Awareness of Smartphone Viruses:
There were 57 male respondents, of which 8 (14.0%) answered yes to being aware of a smartphone virus. There were 61 female respondents, of which 4 (6.6%) answered yes to being aware of smartphone virus. Interestingly, despite twice as many males as females being aware of viruses, this doesn't seem to affect their concern of having information stolen, as shown in the previous comparison.

Operating System Regarding Concern of Getting a Virus:
There were 28 respondents that have the Android OS, of which 8 (28.5%) were either not very or not at all concerned. There were 56 Apple iOS respondents, of which 28 (51.9%) were either not very or not at all concerned. When asked for an explanation on their reasoning, several iOS users responded along the lines of "Apple is good about not [getting] any viruses," as summed from a respondent. This perception is perhaps a carry over from the Apple's marketing of Macs not getting viruses; a separate study would need to be conducted to confirm this suspicion.

Age Regarding Concern of Having Private Information Stolen:
There were 18 respondents in the 30-45 range, with 10 (55.6%) being at least somewhat concerned about having private information stolen from their smartphones. Compared to the average percentage of respondents with this age group removed, 32.8%, respondents within the 30-45 range are much more likely to be concerned of having private information stolen.

Summary of Results

Of 120 respondents, 1 (0.8%) was aware of having private information stolen from her smartphone. Based upon the survey responses, current concern of having private information stolen is unsupported and there is not a reason for concern at the present. However, as the functionality and the number of users grow in the future, so does the chance of smartphones becoming targets for viruses and data theft. At current, it is inconclusive regarding the concern and the chances of getting a virus on a smartphone. Presently, the risks associated with smartphones are almost nonexistent; however, the risks are perceived out of extreme caution and vulnerabilities that may become more exposed as smartphones become as ubiquitous as computers.

References

Bi, Q., Zysman, G.L., Menkes, H. (2001). Wireless mobile communications at the start of the 21st century. *Communications Magazine,* 39(1), 110-116. doi:10.1109/35.894384

Cheng, J., Wong, S., Yang, H., Lu, S. (2007, June). SmartSiren: Virus detection and alert for smartphone. The 5th International Conference on Mobile Systems, Applications, and Services, San Juan, Puerto Rico. doi:10.1145/1247660.1247690

Farley, T. (2005). Mobile telephone history. Telektronikk, 101(3), 22-34. Retrieved from http://www.cems.uwe.ac.uk/~rwilliam/CSA_course/mobile_phone_history.pdf

Shih D., Lin B., Chiang H., Shih M., (2008) Security aspects of mobile phone virus: a critical survey. *Industrial Management & Data Systems*, 108(4), 478-494.

Töyssy, S., Helenius, M. (2006). About malicious software in smartphones. *Journal in Computer Virology, 2*(2), 109-119. doi:10.1007/s11416-006-0022-0

NOTES

A QUALITATIVE ASSESSMENT MODEL FOR BUSINESS INFORMATION SYSTEMS PROGRAMS FOR ACCREDITATION EFFORTS

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Abstract

This paper describes the implementation of a course that is a requirement for graduating seniors in an undergraduate Business Information Systems (BIS) program at a regional university. The description provides a model which includes the culmination of students' academic training in Information Systems, IS, curriculum which is part of a Bachelor of Business Administration (BBA) program in an accredited college of business. The course has been used to fulfill the assessment requirements for the Association to Advance Collegiate Schools of Business (AACSB) The requirements include an application of technical and business skills, as well as systems development and project management skills—all working on an actual information technology project for an external sponsoring organization. Rationale for implementing this type of course includes the benefits it provides to the students, the project sponsors who participate in the projects, and the IS department providing the training. Feedback from the course is used as integral part of the curriculum assessment process used for accreditation purposes.

Keywords: *AASCB accreditation, business information systems project management, service-learning, capstone course, evaluation, and assessment.*

Statement of the Problem

The Association to Advance Collegiate Schools of Business AACSB is an association of educational institutions, businesses, and other organizations devoted to the advancement of management education. It also is the premier accrediting agency of business schools and collegiate accounting programs worldwide.

In 2003, AACSB International started a push toward program level outcomes assessment. Major revisions to their standards during 2009 and 2010 expanded their program level assessment orientation. The AACSB Standard 16 now requires that programs,

"adapting expectations to the school's mission and cultural circumstances, the school specifies learning goals and demonstrates achievement of learning goals for key general, management-specific, and/or appropriate discipline-specific knowledge and skills that its students achieve in each undergraduate degree program" (AACSB 2010)

Because the demands for academic programs to adhere to accreditation efforts to meet assessment of learning outcomes, it has become apparent that academic programs that offer business information systems disciplines provide a confident measure to provide qualitative feedback to answer questions regarding the assurance of learning for the accreditation efforts.

Review of Literature

Because project management (PM) is one of the fastest growing career fields in business today, many universities currently include a senior projects class as part of their Information Systems (IS) curricula (Olson, 2001). The role of projects in organizations is receiving increasing attention, and projects are becoming a major learning emphasis as a result (Gray & Larson, 2003). There is a national consensus among information systems educators that project management should be an integral part of an IS curriculum (ACM/AIS Curriculum Committee, 2010). Although some schools present project management as a case-focused course, the course described in this paper presents a client-service based model which provides exposure to "real-world" experiences.

In the case presented, business degree students with a BIS option area were required to take a standard senior management disciplined capstone. The IS faculty did not feel that the required management capstone course properly represented the IS specific coursework that the students take; therefore, an IS specific capstone was developed to help students better integrate their IS coursework, and to help them prepare for a work experience in IS. From a curricular perspective, this class includes two main objectives:

1) To give the students experience in applying IS training on real world problems while still providing them with the security of the academic environment.
2) To help the students learn proper project management and report writing through guided experience in a simulated work environment as an acting project manager.

Description of Methodology

When a client-based model of learning is imposed, the capstone project management course is a critical component of IS curriculum for the benefit of the students involved and the educational values of the program that presents the curriculum. The value students may gain from such a course is more than just the project management concepts taught in the course content. Students may also obtain experience in a real-world work environment doing original projects designed to meet the needs of the sponsoring organization for which they are working within.

The students are not the only beneficiaries of this course, the businesses that they work for can benefit greatly, and the IS department at the training institution/university establishes better relationships with these respective businesses. These businesses or organizations in turn may provide input into the overall curriculum by taking part of the advisory council/committee. The department faculty also directly benefits by evaluating certain components of this course for assessment recording and accreditation efforts. Some schools use these methods for constructing a more effective curriculum (Brewer, 2002; Schwieger, & Surendran, 2009).

For many of the senior students in the projects course this is the first opportunity they might be involved with to apply their skills, in a professional IS-related work environment, outside of a class-room setting. Also, it provides a safe environment because of the presence and involvement of the instructor as a facilitator.

The circumstances create an environment in which students feel safer to take risks. Despite the natural lack of confidence in the first application of their skills, they know they have the support structure of IS faculty within the university from whom they may rely on when they encounter technical difficulties. Also, the required student reports, both oral and written, discussing the status and functioning of the projects to the course instructor on a regular basis, helps to alleviate small problems as they arise so students get assistance with, and learn how, to both find and acknowledge such problems and advise in solving them. This process allows students to build confidence in their skills and abilities and to experience the reality of functioning in a work environment that is altruistic to the program.

During the course of the semester the instructor is also delivering content about both project management concepts and best practices. The content is structured specifically to build concepts and skills as the students need them during the course for their project. Thus, initially content focuses on issues of user interviewing; defining user requirements schedule building, communications and project planning. As the student projects progress content moves on to discussing issues of managing projects, managing groups, managing sponsor communications and project execution. This direct tie between the course's PM concepts and students' project schedules makes a student immediately aware of the relevance of the concepts and skills being taught. Students often struggle to understand the relevance of the content of a primarily lecture-based course, and how this content relates to their lives and work after they graduate. With this integrative content approach students are able to apply discussed concepts and learn immediately how it can benefit or applies to project management work.

Other obvious advantages to students in taking this course include the real work they've done in a sponsoring organization, which they can include on their resumes upon graduation. Also, since students generally take this as one of their last classes at the university they also have the opportunity to do valuable networking with employers and organizations in the region for future job possibilities.

The sponsoring organizations, who receive the value of the students' labors and instructor's mentoring experience in the form of deliverables from the completed IS projects, are most important to meet a need in their respective organization, and the student(s) receive "real-world" experience in return. These small projects also help build relationships between the university and regional businesses which can lead to further opportunities such as student cooperative educational experience, internships, and even collaborative case-based research opportunities. The best result is that many students have received full-time employment with the sponsors after graduation and upon completing the assigned projects.

Procedures

IS students in the project's class are formed into groups of two to four students and the groups are assigned a project during the third week of a 16 week semester course. Student groups are formed on the basis of the student skills necessary to complete sponsor projects. Student skills are assessed through a self-skills assessment survey which students take the first week of class.

The self-skills survey focuses primarily on three areas:

1. programming experience
2. web development experience
3. experience with database design and management.

This survey also includes a section asking students for the topic they would feel least comfortable working in and the topic they would most like to work in. For modeling a more realistic work experience, students do not accept projects individually; however, it is acceptable for them to work on an existing project management team in the organization. A large part of project management is dealing with people who work in different aspects of a project team; therefore, there is a definite proponent of acquiring a subject matter expert (even if that includes/discuss the instructor of the course). The sizes of student groups are based upon the estimated hours to complete the project, and upon the need to get an adequate collection of skills necessary to complete a given project. Sometimes the team may even work on a particular phase of a project, and then conclude to the next semester for another team to take the subsequent phase.

Student projects are derived from the needs of the organizations and business that agree to sponsor the students to do work for them. Sponsoring organizations can be local businesses, local nonprofit organizations, and sometimes various departments within the university who have a need which fits the required needs of the student learning objectives. All these organizations have a need that can be met through the IS deliverables produced by the project that is assigned to the student team(s). The standard size for a project is approximately 50-70 hours of work per student per semester. Therefore, a minimal requirement for the average group of three students for a project requires approximately 175 man-hours of work. If the team (or project is adjusted), the required student learning objective is adjusted for the needs required for the project(s) provided by the clients.

Projects are minimally scoped by the instructor in discussions with sponsoring organizations. Most of the instructor's efforts scoping the projects are done to assure that they can be completed within the allocated hours and the 12 to 13 weeks students have to work during a semester. Projects are also limited to those which students, having completed an IS program, would have the skills to be able to complete. Table 1 shows a breakdown of the types of projects that students have participated in during the last 4 years.

Table 1. Student Groups and Assignments

Project Type	Number	% of all projects
Business web site	27	47
Informational web site	2	3
Networking project	4	7
Database Development	22	38
Application Development (Programming)	3	5

When student groups are formed they are immediately given contact information for their sponsoring organization and their sponsor. Student groups are then responsible to meet with project sponsors within the sponsoring organization and begin the process of gathering these requirements and scope definition. Students are fully responsible for all contact with the sponsor from this point forward, and are expected to make all necessary arrangements for future communications throughout the remaining 12 to 13 weeks of the project. From the perspective of the student projects the instructor's role is that of a facilitator and the students are expected to interact with the instructor as if the instructor were a senior project manager responsible for the project in terms of the students reporting on project status operations.

The instructor interviews potential sponsors to assure that the project is suitable in terms of required expertise and the amount of required work to complete. One of the important aspects of this course is for students to get experience in doing systems analysis and design. The instructor should spend significant time interviewing the sponsor to fully scope the project prior to assigning it, therefore, during the initial interview of students with the sponsor, the sponsor will be more thoughtful and educated about the project. Limiting the initial discussions between the instructor and sponsor will give students a more realistic experience in working with details of the projects themselves.

Scope problems of this method might include:

1. Students could miss significant aspects of the projects scope or deliverables initially setting up the project.
2. Students may not fully understand the scale and requirements of the project they have scope, and thus running the risk of that have sufficient time to complete the project as scoped,
3. Students may end up with a project that is not what was initially expected from the project description given by the instructor, because the instructor, lacking a complete interview process with the sponsor, was not able to properly ascertain the

sponsor's exact requirements for the project description.

During the twelve to thirteen weeks in which students are working on their projects they are required to give a number of both oral and written reports on the project's status. Students are expected to maintain and monitor the status of the project through the use of project management software, and they are expected to demonstrate their functional use of this software in their oral and written reports. Students are expected to maintain regular and adequate contact with project sponsors to assure project quality and that the project meets all goals.

Instructor contact with sponsors is kept a minimum to allow the students free interaction so they may learn about proper communication with the project sponsor. Instructor contact with sponsors is limited to two to four follow-up calls during the semester to assure that students are:

1. maintaining adequate communication lines with the sponsor.
2. doing the work that is reported.
3. aware that the sponsor has no serious reservations about the status of the project or the student's competencies in being able to achieve the project's scope.

(Table 2 (Appendix A) shows the reporting that students are required to provide during the project.)

To help contribute to the technical success of the project, students are encouraged to get consulting help with technical issues from faculty in the IS Department. This contact with faculty is, for the students, an opportunity to refine, confirm and improve the technical skills they need to complete the project. These consultations are also good for the faculty member since they provide an opportunity to observe students practicing the skills that are taught in the IS curriculum program. This provides a valuable form of program assessment, which gives holistic feedback to faculty for/with/about students and subjects presented to the student during the educational program.

All of the IS faculty should participate in this consultative process with various student groups. Such consultative relationships are most often arranged informally by students seeking the advice of faculty they have learned from during the educational program. Sometimes the projects course instructor will arrange such a relationship if students are in need of technical help to complete a project.

Conclusions/Findings

Many indicators have shown that students consider this course a very valuable part of their IS curriculum. Feedback from exit surveys of BIS seniors has consistently listed the capstone class as very valuable. Also, another indicator of the value of this course is that many BIS alumni who have completed this course and have become occupied in IS positions in the region have approached the instructor and offered to act as sponsors. These alumni have found great value in the class and the efforts of learning project management through a real-world project and they wish to provide similar opportunities for other students. Feedback from other faculty in the IS program and from sponsors, taken for program assessment purposes, also shows a great deal of positive support for this class.

Currently efforts are underway to quantify the value of this class to the project sponsors and sponsoring organizations. This effort is being conducted through the development of a survey to be given to sponsoring organizations that have sponsored a project in the last four years. The survey will look at the value of previously completed student projects to the sponsoring organizations to try to assess whether these projects have met the user need for which they were developed, and whether the project deliverables are still in use.

Current efforts towards improving the class include:

1. Improving student understanding of user requirements gathering both best management costs and better coordination through the students' required prerequisite systems analysis and design course.
2. Improving students' user interviewing skills through better coordination with their required oral business communications class.
3. Seeking better samples of corporate project report templates currently in use in industry in order to give students a better understanding of reporting requirements in project management today.
4. Including emphasis and understanding for students of the role of project manager certification and helping students understand the value of the class in gaining project management certification.
5. Capstone courses in MIS (Management Information Systems), BIS (Business Information Systems), CIS (Computer Information Systems) and CS (Computer Science) programs are commonly incorporated into curriculum as they can be used effectively to assess several program objectives. This format provides considerable opportunity for collaborative learning, serves as an

instrument for assessing the respective program objectives relating to both technical and professional (soft) skills, and meets the learning outcomes of general educational requirements for accreditation agencies for higher education.

To achieve the goal of assuring that students achieve objectives presented throughout the program of learning, the participants, working in groups on a client sponsored project, apply the systems they have learned about while they are exposed to recent developments in the field.

Appendix B illustrates a common evaluation instrument which could be used by faculty to assess a presentation by students who have finished the process of such a capstone course. The last review of the AACSB peer review team of the school using this method received a merit that it is a model for quality assessment. Although it does not include the qualitative mode often associated with business schools, it definitely provides a most impressive assessment representation for information systems programs.

References

AACSB (2009). *Maintenance of Accreditation Handbook.* AACSB International.

AACSB (2010). Eligibility Procedures and Accreditation Standards for Business Accreditation. AACSB International.

ACM/AIS/AITP (Association for Computer Machinery and Association for Information Systems and Association of Information Technology Professionals) Curriculum Committee (2010). IS2010 Curriculum update. Retrieved February 9, 2011, from http://www.acm.org/education/curricula/IS%202010%20ACM%20final.pdf.

Brewer, J. L. (2002). 19th Annual Conference for Information Systems Educators Proceedings of Information Systems in Education Conference, Volume 19, San Antonio, TX. Retrieved November 12, 2003 from http://colton.byuh.edu/isecon/2002/321c/index.html.

Gray, C. F., and Larson, E. W. (2003). Project Management the Managerial Process. New York: Irwin/McGraw-Hill Higher Education, Inc.

Olson, D. L. (2001). Introduction to Information Systems Project Management. New York: Irwin/McGraw-Hill Higher Education, Inc.

Schwieger, D., & Surendran, K. (2009). Enhancing the Value of the Capstone Experience Course. 28th Annual Conference for Information Systems Educators Proceedings of Information Systems in Education Conference, Volume 26, Washington DC. Retrieved June 6, 2010. http://proc.isecon.org/2009/3313/index.html

Appendix A
Table 2. Student Reporting

Report	Type	Number Required	When Required	Description and purpose
Interview and Business Systems Report	Written	1 per individual student	1 week after first sponsor contact	- Describes the information gained from initial contact interview - Describes the organizational system in which the students' project deliverables will function
Feasibility and Planning Report (FPR)	Written	1 per group	3 weeks after first sponsor contact	Initial planning documents focusing on: Scope Definition Planning of project control structures for scope and communication Initial Work Breakdown Structure Signed by Sponsor to show approval
Design Report (DR)	Written	1 per group	4 weeks after FPR	Final Planning documents with: Full design specifications for project implementation Full Work Break Down Structure Full Gantt Chart showing project schedule
Report	Type	Number Required	When Required	Description and purpose
Status Reports	Written	3 per group	At 2 week intervals starting one week after FPR	To keep instructor informed as to the status of the project schedule and any developing problems.
Project Manager's Report	Oral	2 per individual student	At 2 week intervals – alternating weeks with written status reports	To keep instructor informed as to the status of the project schedule and any developing problems.

Appendix B
Faculty Curriculum Assessment Observation Form

Student Project Presentations

Semester:_____ **Project Title**:_____ _____

Using the scale shown below, please assess to what extent the students giving this presentation demonstrate mastery of the 14 objectives listed in the table. This scale is relative to the skills and training that our students should receive within our BIS curriculum. "Expected level" therefore would indicate that students demonstrate the level of competence that you feel our BIS graduates should have upon completion of our program. (Please note that further information on how details of these projects demonstrate competencies of our graduates will be assessed by review of written project portfolios.)

N/A	**1**	**2**	**3**	**4**	**5**
Objective cannot be assessed from the work presented	Minimal or no evidence of the objective was observed	Lower than expected competency in this objective observed	Expected level of competency in this objective observed	Higher than expected level of competency in this objective observed	Exceptional competency in this objective observed

Objective being assessed	Score
Communication Abilities	
1. Good speaking and presentation skills appropriate for a business report	
2. Understanding of audience for presentation	
Accurate and appropriate use of professional language: 3. Technical Terminology 4. Business Terminology	
5. Ability to function as a group, specifically to organize and present a group report in a coherent manner	
6. Ability to explain project work clearly and concisely	
Understanding and management of project	
7. Professional commitment to the project, sponsor and sponsoring organization	
8. Understanding of system in which the project's deliverables will function.	
9. Adequate and proper use of Project Management methods and practices	
10. Proper and adequate scoping and planning of project	
Project Design and Solution	
11. Adequate and proper use of good Design Methodology	
12. Ability to do original design and problem-solving	
13. Are the project and its deliverables an appropriate solution (for novices in the profession) to the problem addressed?	
14. Extent to which this project challenged students to learn new skills outside those directly taught within the BIS curriculum.	
Other (please write in):	

Additional Comments: (Please include other comments relevant to how this presentation conveys valuable assessment information about our curriculum. Continue comments on back if necessary.) (Also, feel free to comment about this assessment tool itself and its validity, effectiveness, and make suggestions for improvement of it.)

NOTES

Rethinking Skill Development for General Business Majors

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Abstract

This article presents abbreviated findings from an exploratory study focusing technology and self-directed teams. Specifically, the study examined skill sets, technological applications within self-directed teams, which can be used to bridge the gap between theory and practice. Findings of the study will be used to continue development of a larger study which focus on skill gaps between theory and practice.

Introduction

This exploratory study examined two major workforce skills: technological applications and self-directed teams. These two skill sets are often mentioned by accreditation organizations and practitioners to suggest that business schools should "rethink" pedagogical approaches focusing skill development rather than content assessment (AACSB International, 2003; Laff, 2006).

The recommendation that business faculty should "rethink" pedagogical approaches focusing these two skill sets is an ongoing discussion. Possibly, driven over the years by corporate scandals which required; organizations to "rethink" communication technology, in response to employees demanding effective organizational communication, as an option for countering false information. Employees with the ability to select and apply communication technology, especially, given the numerous organizations that use geographically dispersed self-directing teams, which require timely communication during scandals; can mediate negative perceptions.

Exploring this "industry challenge" provided data that can be used to modify course material for improvement of learner outcomes related to real world business applications. The data also contributes to current literature focusing these two skill sets by providing strategies that can be practically applied in the workplace. For example, technology will change before this information is printed. These changes can and will directly affect communication channels used by self-directed teams. Subsequently, issues related to bridging the gap between theory and practice can be examined and addressed. This could position business faculty to prepare students with current skill sets recommended by industry.

Primarily, most General Business programs are designed for its majors to receive a broad overview of fundamental theories and procedures of basic business functions. This interdisciplinary approach is designed to provide majors with core business applications that will enable professional employment opportunities within various industry sectors. Graduates with this degree should be able to utilize applicable skill sets, in this case, technological and self-directed teams, required by industry.

Statement of the Problem

Practitioners content that business schools are not preparing students with skills needed in industry (Daft, 2003; Druskat & Wheeler, 2004; Laff, 2006). The purpose of this exploratory study was to determine the effects of incorporating technology within self-direct teams.

Review of Related Literature

The following definitions and relevant literature limits the scope of this exploratory study.

For this study, technology was defined as software which allows people to connect, work computing or collaborative computing. This definition was used given the range of issues related to common, email, whiteboards, and emerging tools, virtual meeting spaces.

Self-directed teams were defined using widely accepted definitions of teams. A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems, and who manage their relationship across organizational boundaries (Cohen & Bailey, 1997, p. 241).

The selected literature focused academic and industry trends with respect to the following questions. What happens when there is a perception from industry that General Business Majors lack specific skill sets required by industry? Should business schools mirror industry and conduct an assessment of core skills or content?

Buckenmyer (2000) contends business organizations repeatedly indicate the increase use of teams in the real world has increased students' need for exposure and experience with teams.

Colbeck, Campbell & Bjoklund (2000) suggested when students work in groups they enhance their goals setting, delegation of work and dealing with conflict.

Maguire &Edmondson (2001) reported that cooperative methods allow students to take an active approach towards their own learning.

Braun (2001) self-directed teams have been used in communication, management and other courses, as well as in distance learning pedagogy.

Baker & Campbell (2005) stated that effective virtual teams have: regular feedback between members, extensive collaboration and communication, team synergy and efficiently use resources.

Nelson, Christopher & Mims (2009) supports the use of technology to build students' understanding of "collective contribution."

These questions were used to explore how and/or if assessment is needed to close the gap-theory to practice with respect to skill set development of General Business Majors.

Methodology

The subjects involved in this study were 32 undergraduate business majors enrolled in a hybrid business communication course using self-directed teams. Demographic makeup include: ethnic- Asian, Black/African American, Hispanic/Latino and White; different age generations (Traditionalists (born before 1946), Baby Boomers (born between 1946 and 1964), Generation X (born between 1965 and 1980), and Generation Y (born after 1980); different experiences - traditional and nontraditional students - mixed experience - seasoned, limited and never employed.

Focus questions were used to collect data for development of a survey. Subjects were asked their perceptions about incorporating technology to build self-directed team skill sets within a hybrid environment. One major finding follows, data from an open ended focus question, used to jumpstart discussion doing the study.

Findings

Findings indicated that there was a significant difference of perceptions (gaps) between academic and practitioners about the effects of incorporating technology within self-direct teams. For this reporting, one issue, experience, is discussed as it relates to bridging the gap between theory and practice.

Subjects involved in the study were assigned to self-directed teams comprised of members with varying experience- seasoned, limited and never employed. Seasoned was defined as (practitioners) having more than five years of work team experiences. Limited was defined as having two years of work and academic team experiences. Never employed was defined as having only academic team experiences. Data for this section was collected during the first stage of team building, forming, which involved getting to know each other inclusive of role assignment.

During discussions, findings showed team members lacked experience with incorporating technology within self-direct teams. Two differences, cultural and age generations were examined within the scope of experience, work and academic behaviors.

The effects of cultural differences were related to ethnocentrism, specific behaviors desired in their culture should be the norm. These findings were influenced by contextual differences; physical cues. This affected the perception and/or outcomes of incorporating technology within self-directed teams.

The effects of age differences were related to, generational differences, workforce age span. These findings were influenced by generational communication; each generation's perception influenced work and academic behaviors. This affected the perception and/or outcomes of incorporating technology within self-directed teams.

Conclusion

The abbreviated findings format was used to show preliminary results for this publication. On the basis of these abbreviated findings, how and/or if assessment is needed to close the gap-theory to practice with respect to skill set development of General Business Majors can be drawn. The abbreviated findings indicated there appears to be significant differences that should be examined prior to incorporating technology within self-direct teams.

References

AACSB International – The Association to Advance Collegiate Schools of Business. (2003, March 10). Proposed eligibility procedures and standards for business accreditation. Retrieved August 13, 2010, from http://www.aacsb.edu/conferences/events/seminars.asp.

Baker, D. & Campbell, C. (2005). When is there strength in numbers? A study of undergraduate task groups. *College Teaching*, Vol. 53, No.1, pp.14-18.

Braun, M. (2001). Using self-directed teams to integrate service-learning into an organizational communication course. *Southern Communication Journal*, 66, 226-238.

Buckenmyer,J. (2000). Using teams for class activities: Making course/classroom teams work. *Journal of Education for Business*, 76 (2), 98-107.

Cohen, S.& Bailey, D. (1997). What Makes Teams Work: Group Effectiveness Research from the Shop Floor to the Executive Suite," *Journal of Management*, 23 (3), 239-290.

Colbeck, C. Campbell, S. & Bjorklund, S. (2000, January/Febuary). Grouping in the dark: What college student learn from group projects. *The Journal of Higher Education* , 71 (1), 60-83.

Daft, R. (2003). *Management*, 6th ed. Cincinnati: Thomson South-Western, 614.

Druskat, V. & Wheeler, J.(2004). How to lead a self-managing team. *MIT Sloan Management Review*, 45,(4),65-71.

Laff, M. (2006). Effective Team Building: More Than Just Fun at Work. *Training* t D*evelopment*. 24-35

Maguire, S. & Edmondson, S. (2001). Student evaluation and assessment of group projects. *Journal of Geography in Higher Education*, 25 (2), 209-217.

Nelson, J., Christopher, A. & Mims,C. (2009). TPack and Web 2.0: Transformation of teaching and learning. *TechTrends, 53(5),* 80-85.

NOTES

The Role of Trust in Online Social Community

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Abstract

The organizational literature has devoted a lot attention on how trust can improve performance, and the e-commerce literature has various discussions about buyer-seller trust relationship. While there has been much work done to exam trust in organization or e-commerce content, there is lack of studies of trust in pure social interaction online community where members simply aim to build up social connections and share information. This paper extended the concept of online social community to a more general level which includes three types: e-market based community, discussion based community, and pure social interaction online community. Within this content, the paper re-conceptualized trust from a dynamic process perspective. It argues that trust is a long term interaction process which becomes stronger through calculus-based, knowledge-based and identification-based trust phases. Three general types of mechanisms have been discussed, through which can control 5 important factors (competence, reliability, benevolence, integrity and collective identity) to develop trust on each stage. Nine expected behaviors in different type of online social community along trust development process are also presented.

Introduction

Trust has been considered as an important factor in a healthy and efficient social system. It has been explored by various disciplines from different perspectives. With advanced information technologies, trust, as a social factor, has got lot attentions in information research area. Three streams of information system studies have widely borrowed trust theories – trust between human and automated systems, trust in e-commerce settings and trust in virtual team.

Trust with automated System

The first stream has well explored the dynamics of trust between human and automated systems (Bailey & Scerbo, 2007; Madhavan & Wiegmann, 2007; Reid & Levy, 2008). Trust is one of the important factors that influence the effective use of automation. Trust toward the system decides users' willingness to believe information from a system or make use of its capabilities, which is the core of system adoption and adaption during implementation phases. Researchers dedicated to find design factors to improve system reliability and accuracy which have been empirically proved as main antecedences to trust between human and system (Parasuraman & Miller, 2004).

Trust with E-commerce activities

E-commerce literatures have extended automated system literature with advanced developing technology like agile computing. With easy and flexible developing techniques, B2B and B2C have become popular among organizations. Organizations provide service to customers or find partners online. For example, manufactures can find proper material provider through an information pool, or banks can provide online access service to customers. However, it is questionable that whether organizations and end customers could trust these automated service system instead of face to face services. System reliability and information accuracy are still critical factors to trust in B2B and B2C e-commerce content(Reid & Levy, 2008). However, more researchers are interested on the role of institutions in promoting trust online (Kun Chang, Inwon, & McKnight, 2007). Empirical studies indicated that offline institutional trust can be transformed into high level of perceived assurance in online environment (Kun Chang et al., 2007).

In addition, cloud computing provides tons of C2C opportunities to individuals, such as the service provided by eBay.com and Amazon.com. The trust between buyers and individual sellers on e-market has driven dramatically attentions from researchers. Trust has been approved empirically to link with selling profits on e-market (Everard & Galletta, 2005; Lim, Sia, Lee, & Benbasat, 2006). Website design factors such as navigation design, visual design, and information design have been empirically proved as antecedents to trust on e-market (Cyr, 2008). Empirical studies also indicate that cognition factors, such as word of mouth effect, perceived security and privacy protection, third-party seal, and referral, contribute to build trust in e-vendors (Awad & Ragowsky, 2008; Kim, 2008).

Trust with Virtual Team Management

Finally, information system researchers have devoted effort on studying trust in virtual team. Virtual team is different from traditional team in the way the members do not have face to face communications on regular basis. Even trust in working settings has not been approved to contribute to performance directly

(Adams, Bryant, & Webb, 2001), literature about virtual team have found that trust is an important component in team development and effectiveness. It has been argued that trust delivered within virtual group will reduce conflicts and management effort, which in turn improve cooperation among team members (Johansson, Dittrich, & Juustila, 1999; Erdem & Ozen, 2003; Jarvenpaa, Shaw, & Staples, 2004).

Goal of the Study

Trust with Online Social Community

Online social communities, as part of e-commence phenomena, has been explored in information system literatures. Researchers focus on design factors and cognitive factors that influence individual participation decisions in online communities. However, the trust issues in online social communities have been avoided in research studies due to its complexity and immeasurable. A few studies have draw attentions on design factors that would help to form trust in online social communities, however, they failed to discuss the implications of trust in online social communities. It should also be aware that online social communities can embrace all e-commerce models including C2C, C2B, B2B and so on. Online social community is a general environment for these business models and all the transaction choices are heavily determined by trust among group members within the micro society. Lack of understanding of trust in social content actually defers the understanding of all activities in e-commerce environment. Therefore, the first goal of this study is to complete the blank area by understanding the deeper implications of trust in online social community content. In order to understand trust development in social community comprehensively, this study consider online social community as a general term, which include e-market based online community (e.g. Amazon.com), discussion based online community (e.g. online discussion forum), and pure social interaction online community (e.g. Facebook.com, Linkedin.com).

The second goal of this study is to re-conceptualize trust in the content of online social communities. Current studies about trust in e-commerce environment have conceptualized trust as choice behavior based on weighing perceived risks and benefits. Whenever the members in group have made trust decision, a trust state, which consists of institutional trust, calculative trust and relational trust (Rousseau, Sitkin, Burt, & Camerer, 1998), will be achieved. These dimensions of trust have been approved to influence seller-buyer relationship on e-market differently. However, these studies considered trust as a single state or one time choice behavior without thinking about **where trust is originally developed from, how to enforce trust, and how to maintain trust in e-commerce environment**. Thus, the second goal of this study is to answer above questions by re-conceptualizing trust as a process instead of single state or one time choice behavior. Lack of understanding of trust as a process will result in short term trust which cannot benefit business activities from long term perspective.

The left paper is organized as following. A short literature review about trust as a process will be presented. This literature review will construct trust process model. Based on this process model, how to develop trust in online social network will be discussed, including the general process and factors that affect the development of trust. Finally, the implication of trust in online social network will be argued.

Literature Review

Social psychology literatures suggest that interpersonal trust develops historically as it takes time to establish the knowledge and experience necessary to trust another person. At the beginning of trust development process, people posses limited information about their partner, in that they can only evaluate trust using behavioral evidence. Most previous studies stopped here by considering trust as single state or choice behavior. However, as more information has been collected during late phase of trust development, people will use other attributes as indicators of trustworthiness. Therefore, the discussion of trust as a process will provide a full understanding of the implication of trust in online social community.

There are several trust theorist have formulated development of interpersonal trust. For example, Rempel et al. (1985) propose a model outlining the development of trust. They argued that interpersonal trust develops as interpersonal relationships mature and is associated with progression through three stages: establish predictability, establish dependability and establish faith. These three steps lead to security and confidence in relationship. Rempel's model is a generic model which covers all the complexities of trust (Rempel & Holmes, 1985).

Lewicki and Bunker (1996) has extended Rempel's model to better describe each trust state during the development process. They argued that trust development is a progress through 3 continuous

stages, from calculus-based trust, knowledge-based trust, to identification-based trust (Lewicki & Bunker, 1996).

This study adopt Lewicki and Bunker (1996)'s model as the corner stone of theoretical framework. Their framework can fit into online social network content well. At the early stage of a relationship in online social community, people barely know each other without any prior shared experience. At this point, trust is calculus-based and is predicted on the calculation of costs and benefits of engaging in trust behavior. Whether group members could move on to knowledge-based trust depends on whether a higher dependability is required by the situation or the relationship (Rempel, Ross, & Holmes, 2001). Few relationships can move on to knowledge-based trust, while even fewer relationships will move to Identification-based trust stage where requires high level of interdependence and faith.

Research Model

Fig 1 in Appendix 1 shows the research model in this study based on trust development from calculus-based to Identification-based.

The middle layer in Fig 1 is derived from Lewicki and Bunker (1996)'s development model of trust which explains three steps of trust development. The major arguments in current study will be what factors will influence trust development and how to control these factors through mechanism on each stage (bottom layer in Fig1), and what kind of behavior will be derived from trust development on each stage (Top layer in Fig 1).

Theoretical Development

Stage 1: Calculus-based Trust

Calculus-based trust is developed at the early stage of a relationship. It is not based on positive intentions toward others, but on the assessment of the perceived cost and reward of engaging in interaction with other. This judgment is mainly based on trustee's previous behaviors. Therefore, a system that can record and assess trustee's previous behavior will help to create calculus-based trust.

Researchers found that calculus-based trust is most often related to the workplace because people tend to operate on a reward/punishment system (Lewicki & Wiethoff, 2000). Such reward/punishment system also exists in online social communities. Online communities always have their own reward and punishment mechanism in different format. For example, if the member helps other members to solve problem, he/she may gain some virtual rewards points or gain higher ranking title. Online community system maintains an evaluation system based on the record of members historical activities and comments from others. This evaluation mechanism provides relative objective information to members in that they could decide whether to trust partner with whom shared no experience.

The core of the evaluation mechanism should be the competence and reliability of members. Social psychologists found that competence is a key factor in determining the degree to which trust will be conferred on another person (Schoorman, Mayer, & Davis, 2007). When people are judged to be competent and reliable, the information they provide to others is judged to be more trustworthy and more influential. The meaning of competence and reliability in online social communities are determined by the content of the social community.

If the social community is an e-market based community, such as Amazon and eBay, the competence of a seller is determined by his/her products and service. The reliability of a seller is decided by whether the products and service are exactly same as descriptions.

If the social community is questions-answer based discussion forum which aims to share common interesting and value among members, the competence of a member would be whether the member possesses the knowledge and skills to answer questions, and evoke interesting discussions. The reliability of a member could be whether he/she can answer questions correctly in a fast respond fashion.

If the social community is a pure social interaction website which aims to extend social network and to communicate information fast, such as Facebook.com, Linkedin.com and Twitter.com, the competence of a member would be determined by profile of the member, active postings and the size of the member's social network connection. The reliability of a member would be measured by historic activities and comments from other members in the social community. Therefore, person's perception of trust partner's competence and reliability is one of the most crucial factors that will influence trust development on calculus-based stage.

For any types of online social communities, they should all design an evaluation mechanism to evaluate competence and reliability of each member. The evaluation mechanism will help members to start

the journey of trust in online social communities. As a result, the first proposition is about impact of evaluation mechanism on calculus-based trust.

Proposition 1: An evaluation mechanism of member's competence and reliability will help develop calculus-based trust.

Actions will follow once people make decision to trust partners on calculus basis, based on information collected from evaluation mechanism. In an e-market based online social community, transaction will happen. Empirical studies linked trust to purchase decision and profits gain in the e-market based online social communities (Ba, 2001; Kim, 2008; Jin, Cheng, & Yunjie, 2009). In a discussion based online social community, a debate or discussion will be evoked. It could be opinions toward a specific products, attitude towards a social phenomena, or discussions about how to solve problem. In a pure social interaction community, calculus-based trust will result in extending social network by adding a new person to it. Therefore, the second proposition is about what are consequence activities of calculus-based trust in different online social community's content.

Proposition 2: Higher level of calculus-based trust will lead to purchase decision, evoke discussions, or result in extended social network in online social communities, depending on the content of online social communities.

Members will decide whether to move the relationship to next stage by evaluating feedback of these actions. If members have not got the product or service as expected, have not gain accurate and valuable information from a discussion, or fail to communicate with new person, the relationship will stop on calculus-based stage instead of moving on to knowledge-based trust stage. Next part will present the argument about how members move from calculus-based trust stage to knowledge-based trust stage, and what are the factors influencing this progress.

Stage 2: Knowledge-based Trust

Knowledge-based trust is developed from the feedback of trust behaviors during calculus-based trust stage. Calculus-based trust stage is a short phase which will either move on to the relationship on next stage or stop the relationship right away. It depends on the interpretation of behaviors during calculus-based trust stage. These interpretations formulate judgments about the trustworthiness of a partner in term of predictability and dependability (Adams et al., 2001).

During knowledge-based trust stage, members will get more chances to observe behaviors of trust partner. Researchers argued that people become able to predict what others will do by increasing observations of their behavior (Lewicki & Wiethoff, 2000). Through increasing positive interpretations towards observed behaviors under different content, discrete behaviors are increasingly integrated into a cohesion view of a trust partner. Two factors will help portrait disposition of the trust partner (Schoorman et al., 2007).

The first factor is benevolence. It is defined as the extent to which a trustee is believed to want to do good to the trustor (Schoorman et al., 2007). Benevolence is kind of intrinsic motivation to benefit partner without considering any extrinsic benefits. High level of perceived benevolence will lead to positive interpretation of partner's behavior. These positive interpretations will formulate judgment of trust on knowledge-based stage.

The second factor is integrity. It is conceptualized as a perception that person share or at least agree on a set of principles with trust partner (Schoorman et al., 2007). For example, in an online social community, if members share the same belief that privacy is important on Internet, it will contribute to judgment of trustworthiness within the community.

Empirical studies of seller and buyers relationship in e-market online communities have accepted benevolence and integrity as antecedences to trust (Gefen & Straub, 2004; Pavlou & Dimoka, 2006). They found that benevolent characteristics of sellers, such as free shipping, negotiable transaction, fast refund and tolerance of return, are positively related to purchase decision through increased trust. Integrity is also found to be positively related to purchase decision. Benevolence and integrity also influence the judgments of trustworthiness in discussion based and social-interaction based online communities. Though there are no empirical studies in information system research area to support the argument, the theoretical development of how benevolence and integrity influence the judgments of trustworthiness in collective settings can be extended to these two types of communities (Schoorman et al., 2007).

In order to develop trust on knowledge-based stage, online social communities have to design a mechanism that can help members to perceive others capability of benevolence and integrity. Therefore, the third proposition argues the importance of a mechanism which can present benevolence and

integrity of each member in online social community. Community could design a mechanism which encourages communications among members. Members will get chance to exchange information during interactions which makes the development of common values or principles (Das & Bing-Sheng, 1998). Community could also ask members to specify their personal profile by answering specified questions. These questions could evaluate their attitude and believes toward benevolence and integrity.

Proposition 3: A mechanism depicting member's benevolence and integrity will help develop knowledge-based trust.

Actions will follow once members make decision to trust trustee on knowledge basis, according to information gathered from benevolence and integrity presentation mechanism. In an e-market based community, buyers intend to build up a long term relationship with sellers. When all the other factors are similar, buyers will make priority purchase from sellers whom they trust on knowledge-based. However, knowledge-based trust is not strong enough to create customer loyalties. When making the purchase decision, customers always explore alternatives opportunities.

In discussion based online community, members will build up a preference list about whom should refer to when encounter some problems. Therefore, members identify expertise by themselves through accumulating experience.

In pure social interaction community, knowledge-based trust will lead to deeper communications between trustor and trustee. The content will change from superficial small talks to meaningful topics, such as shared values, believes, and life experience. Therefore, the fourth proposition is about what consequent activities of knowledge-based trust in different online social community's contents.

Proposition 4: Higher level of knowledge-based trust will lead to priority purchase decision, identify expertise, or result in deeper communication in online social communities, depending on the content of online social communities.

Small sellers on e-market may choose to stop putting effort in developing trust into next stage because that all they need is the priority consideration of their products and services. However, trust in online social communities can provide more than that. Next section will discuss the implications of highest form of trust and what kind of factors will influence it.

Stage 3: Identification-based Trust

Identification-based trust is based on identification with another person. Social psychology researches indicate that as relationships develop, increasing information about another people's behaviors, preferences, and motives lead to identification with this person (Lewicki & Wiethoff, 2000). Therefore, Identification-based trust requires parties to take amount of time to develop their common interests, values, perceptions, motives and goals. Identification-based trust will reduce risk and uncertainty inherent in a relationship dramatically (Adams et al., 2001). Members will think like the other, feel like the other and behavior like the other (Lewicki & Bunker, 1996). However, identification-based trust is very hard to achieve. One strategy to build identification-based trust is through increasing the parties' calculus-based trust and knowledge-based trust. This strategy is part of trust development process and requires amount of time and effort to develop.

Another strategy is to develop a collective identity which could facilitate establishing identification-based trust by creating community or group identity(Adams et al., 2001). Social psychologists argued that identifying with another person, and categorizing this person as members of one's own group may influence how much trust is placed in this person (Kramer, Brewer, & Manna, 1996). The mechanism that can help members to increase collective identity should be deployed in online social communities.

Proposition 5: A mechanism that can help members to increase collective identity will help develop Identification-based trust.

Such mechanisms are various depending on the content of online community. In e-market based online community, community system could use clouding computing techniques which allow sellers to design their own selling webpage flexibly. In that way, the sellers can name the online store and design logos which all facilitate formation of collective identity among potential customers. The collective identity among buyers will contribute to create identification-based trust toward the seller. Once identification-based trust established, buyers will have faith on sellers. The belief that the seller is a guaranty of product quality, fast shipping, and best customer service helps customers to make purchase decision without consider alternatives. Therefore,

identification-based trust toward the seller is actually transferred into customer loyalties toward the same seller.

Discussion based online community can design a mechanism which is easy for members to group members by the degree of similarity. In that way, members will find a group they belong to and increase collective identity by perceiving similarities among group members. The identification trust behavior is expertise effect, which means once members identify themselves within certain group and developed identification-based trust, the identified expertise will become the most important person in the group who will influence on decision making of other members. For example, organizations could take advantages of expertise effect to promote their products and service. Members have identified expertise on knowledge-based trust stage. On identification-based stage, members will identify themselves as same to this expert, and follow what expert does in social community. If expertise support certain product or service, all the group members will agree on this because they feel like the other, think like the other, and behavior like the other (Lewicki & Bunker, 1996).

On this stage, discussion based community and pure social interaction community share a lot characteristics. Members identify themselves as group of people share the same values and believes. They have faith in each other in that they could predict others behavior without any priori experiences. Therefore, pure social interaction can also adopt the mechanism which is similar to the ones used in discussion based community. The mechanism should allow members to identify a group of people similar to themselves easily.
However, pure social interaction community has its own advantages, which is the expansibility. Each member in pure social interaction community has a map depicting their social connections. It means that people can extent their social connections easily by adding strangers from friends' networks. Therefore, if the pure social interaction community can design a mechanism to extend individual's social connections by identifying similar people through their friends' network, it would lead to extraordinary phenomena. It is hard to image that how million of people can be solid united fast with shared values and believes, however, it is what happened in 2008 presidential election with the help of online social network. The scalability of discussion based community is not comparable to the scalability of pure social interaction community. Therefore, the consequence of identification-based trust in pure social interaction communities is the most powerful behavior which is far more powerful than expertise effect in discussion based community. It will result in social movements eventually. The final proposition is about the consequent activities of identification- based trust in different type of online social communities.

Proposition 6: Higher level of identification- based trust will lead to customer loyalties, expertise effect, or result in social movements, depending on the content of online social communities.

Implications

This study has several theoretical and practical implications. Firstly, it re-conceptualizes trust from a dynamic process perspective instead conceptualizing it as a static state. It argues that factors will influence on trust development differently according to which stage it is. To understand development of trust in online social communities will help researchers to answer questions like where trust is originally developed from, how to enforce trust, and how to maintain trust in e-commerce environment.

Secondly, this study generally considered e-market based webpage, online forums, and online communities with pure social interactions as online social community. It is because that all these communities require social interaction between members on regular basis. This integration view of online social communities will generalized findings of trust studies across communities.

It should be aware that these are no absolute differentiation among three types of social communities in practice. Most of online social communities will integrated at least two of them together to compensate to each other. For example, Amazon is not only a simple e-market place, but also provides discussion service to customers toward a particular product. Facebook.com becomes a dream platform to new product promotion because of its discussion and word of mouth capability (Awad & Ragowsky, 2008). Therefore, understanding trust framework proposed in this study will help online community designers to use factors on the bottom layers (Fig 1) to design mechanism that could be used for multiple purposes communities.

This study also helps individual sellers and organizations advertisers to understand that how much social influence effort they should exert on developing trust in online community. It is determined by what kind of activities they expect. If they only expect ad-hoc purchase decision or casual

customer relationship, they can stop by calculus-based trust stage. If they expect priority purchase decision or plan to take advantages of expertise effect, they have to exert more effort to achieve knowledge-based trust stage. If a massive social movement was expected, individual or organization should develop Identification-based trust.

Conclusion

This paper discussed how to develop trust in online social communities, and what kinds of different behaviors can be derived along trust development process. The research proposed 5 factors that will influence trust development process on each stage. There are 9 different types of behaviors can be expected along trust development process, which are varied across different type of online social communities. The major findings and examples are listed in tables in Appendix 2. Table 1 depicts that what kind of factors on general level that community mechanism should focus on to improve trust on different development stage (Proposition 1, 3, 5). These mechanisms are valid for all types online social network on general level. Table 2 presents detail examples of these mechanisms in different type of online social communities. Table 3 summarizes what kind of behaviors we can expect as consequence of trust on different stage within different type of online social communities (Propositions 2, 4, 6).

This paper has extended the generalizability of trust by discussing 3 types of online social communities integrally. The re-conceptualization of trust from a dynamic process perspective would call attentions from researchers to reconsider factors that influence trust on each development stage separately.
The study can also be extended by considering more factors that influence trust development process. For example, institutional regulations, social norms and culture are all factors can contribute to calculus-based trust (Kun Chang et al., 2007). More design factors can be included, such as security design, navigation design and ease of use design (Cyr, 2008). These design factors will facilitate trust transformation from one stage to another.

References

Adams, B. D., Bryant, D. J., & Webb, R. D. G. (2001). Trust in teams literature review. In D. O. C. H. I. Defence and Civil Inst of Environmental Medicine, Guelph ONT (CAN) (Ed.).

Awad, N. F., & Ragowsky, A. (2008). Establishing Trust in Electronic Commerce Through Online Word of Mouth: An Examination Across Genders. *Journal of Management Information Systems*, 24(4), 101-121.

Ba, S. (2001). Establishing online trust through a community responsibility system *Decision Support Systems*, 31(3), 323-336.

Bailey, N. R., & Scerbo, M. W. (2007). Automation-induced complacency for monitoring highly reliable systems: the role of task complexity, system experience, and operator trust. *Theoretical Issues in Ergonomics Science*, 8(4), 321-348.

Cyr, D. (2008). Modeling Web Site Design Across Cultures: Relationships to Trust, Satisfaction, and E-Loyalty. *Journal of Management Information Systems*, 24(4), 47-72.

Das, T. K., & Bing-Sheng, T. (1998). BETWEEN TRUST AND CONTROL: DEVELOPING CONFIDENCE IN PARTNER COOPERATION IN ALLIANCES. *Academy of Management Review*, 23(3), 491-512.

Erdem, F., & Ozen, J. (2003). Cognitive and affective dimensions of trust in developing team performance. *Team Performance Management*, 131-135.

Everard, A., & Galletta, D. F. (2005). How Presentation Flaws Affect Perceived Site Quality, Trust, and Intention to Purchase from an Online Store. *Journal of Management Information Systems*, 22(3), 55-95.

Gefen, D., & Straub, D. W. (2004). Consumer trust in B2C e-Commerce and the importance of social presence: experiments in e-Products and e-Services. *Omega*, 32(6), 407-424.

Jarvenpaa, S. L., Shaw, T. R., & Staples, D. S. (2004). Toward contextualized theories of trust: The role of trust in global virtual teams. *Information Systems Research*, 250-264.

Jin, C., Cheng, Z., & Yunjie, X. (2009). The Role of Mutual Trust in Building Members' Loyalty to a C2C Platform Provider. *International Journal of Electronic Commerce*, 14(1), 147-171.
Johansson, C., Dittrich, Y., & Juustila, A. (1999). (1999). Software engineering across boundaries: Student project in distributed collaboration. *IEEE Transactions on Professional Communication*, 286-296.

Kim, D. J. (2008). Self-Perception-Based Versus Transference-Based Trust Determinants in Computer-Mediated Transactions: A Cross-Cultural Comparison Study. *Journal of Management Information Systems*, 24(4), 13-45.

Kramer, R., Brewer, M., & Manna, B. (1996). Collective trust and cllective action: The decision to trust as a social decision. In R. Kramer, & T. Tyler (Eds.), *Trust in organizations: Frontiers of theory and resarch*. Thousan Oaks, CA, US: Sage Publications, Inc. , 357-389.

Kun Chang, L., Inwon, K., & McKnight, D. H. (2007). Transfer From Offline Trust to Key Online Perceptions: An Empirical Study. *IEEE Transactions on Engineering Management*, 54(4), 729-741.

Lewicki, R., & Bunker, B. (1996). Developing and maintaining trust in work relationships. In R. Kramer, & T. Tyler (Eds.), *Trust in organizations: Frontiers of theory and resarch*. Thousand Oaks, CA, US: Sage Publications, Inc., 114-139.

Lewicki, R. J., & Wiethoff, C. (2000). Trust, Trust Development, and Trust Repair. In M. Deutsch, & P. T. Coleman (Eds.), *The handbook of conflict resolution: Theory and practice* San Francisco, CA: Jossey-Bass, 86-107.

Lim, K. H., Sia, C. L., Lee, M. K. O., & Benbasat, I. (2006). Do I Trust You Online, and If So, Will I Buy? An Empirical Study of Two Trust-Building Strategies. *Journal of Management Information Systems*, 23(2), 233-266.

Madhavan, P., & Wiegmann, D. A. (2007). Similarities and differences between human-human and human-automation trust: an integrative review. *Theoretical Issues in Ergonomics Science*, 8(4), 277-301.

Parasuraman, R., & Miller, C. A. (2004). TRUST and ETIQUETTE in HIGH-CRITICALITY AUTOMATED SYSTEMS. *Communications of the ACM*, 47(4), 51-55.

Pavlou, P. A., & Dimoka, A. (2006). The Nature and Role of Feedback Text Comments in Online Marketplaces: Implications for Trust Building, Price Premiums, and Seller Differentiation. *Information Systems Research*, 17(4), 392-414.

Reid, M., & Levy, Y. (2008). Integrating Trust and Computer Self-Efficacy with TAM: An Empirical Assessment of Customers' Acceptance of Banking Information Systems (BIS) in Jamaica. *Journal of Internet Banking & Commerce*, 13(3), 1-18.

Rempel, J. K., & Holmes, J. G. (1985). Trust in close relationship. *Journal of Personality & Social Psychology*, 49(1), 95-112.

Rempel, J. K., Ross, M., & Holmes, J. G. (2001). Trust and Communicated Attributions in Close Relationships. *Journal of Personality & Social Psychology*, 81(1), 57-64.

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). NOT SO DIFFERENT AFTER ALL: A CROSS-DISCIPLINE VIEW OF TRUST. *Academy of Management Review*, 23(3), 393-404.

Schoorman, F. D., Mayer, R. C., & Davis, J. H. (2007). AN INTEGRATIVE MODEL OF ORGANIZATIONAL TRUST: PAST, PRESENT, AND FUTURE. *Academy of Management Review*, 32(2), 344-354.

Apendix 1: Research Model

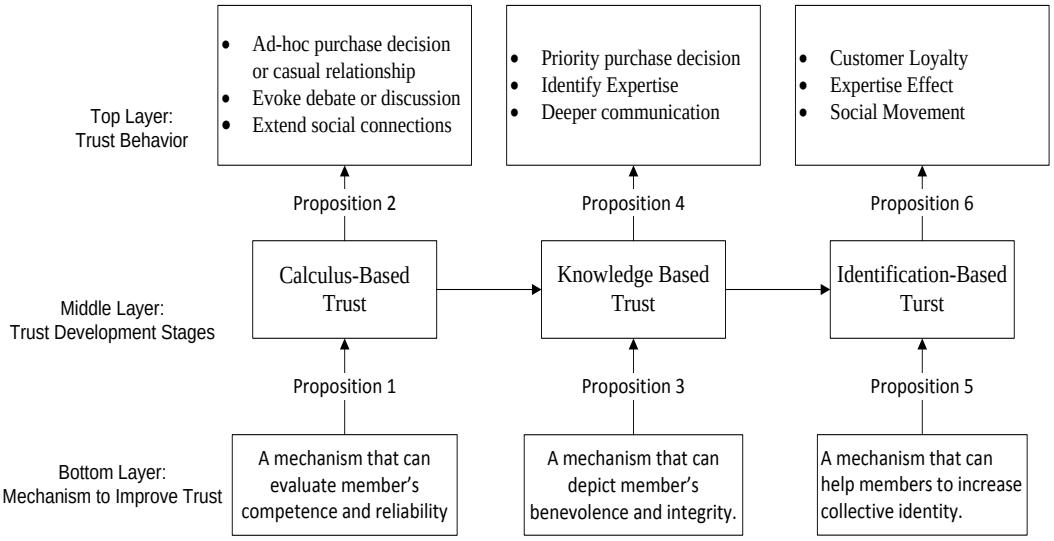

Fig 1: Research Model

Apnedix 2: Result Tables

Table 1: General Mechanisms			
	Calculus – Based Trust	**Knowledge – Based Trust**	**Identification-Based Trust**
General Mechanism	An evaluation mechanism of member's competence and reliability will help develop calculus-based trust	A mechanism depicting member's benevolence and integrity will help develop knowledge-based trust.	A mechanism that can help members to increase collective identity will help develop Identification-based trust.

Table 2: Examples of Mechanism in different type of online social communities			
	Calculus – Based Trust	**Knowledge – Based Trust**	**Identification-Based Trust**
e-Market based Online Social Community (e.g. Amazon.com)	Design mechanism to evaluate seller' reliability by past behaviors in term of respond speed, shipping speed, and whether products or service are same as description.	Design mechanism to evaluate sellers' benevolent by level of negotiable transaction, fast refund and tolerance of return.	Use cloud computing which provides design flexibility to sellers to improve collective identity among buyers.
Discussion Based Online Social Community (e.g. automotiveforums .com)	Design mechanism to evaluate reliability by the ratio of correct answers over total numbers of answers.	Design mechanism to evaluate members' integrity by specifying members' profile in term of values and believes.	Design mechanism to identify similar members.
Pure Social Interaction Online Social Community (e.g. Linkedin.com)	Design mechanism to evaluate competence by member profile, activity level, and size of personal social network connections.		Design a mechanism to identify similar people through friends' social connections.

Table 3: Behavior Consequence of Trust in different type of online social communities			
	Calculus – Based Trust	**Knowledge – Based Trust**	**Identification-Based Trust**
e-Market based Online Social Community (e.g. Amazon.com)	Ad-hoc purchase decision	priority purchase decision	Customer Loyalty
Discussion Based Online Social Community (e.g. automotiveforums.com)	Evoke debate or discussion	Identify Expertise	Expertise Effect
Pure Social Interaction Online Social Community (e.g. Linkedin.com)	Build up casual relationship Extend social connections by adding new person.	Deeper communication	Social Movements

Teaching Data Envelopment Analysis in an Undergraduate Management Science Class

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Abstract

Data Envelopment Analysis (DEA) is a method of identifying the most efficient operators in a group. The methodology is being treated in standard management science textbooks and is, as such, being taught to undergraduate business majors as an, albeit advanced, application of linear programming. The data set in consideration consists of observations of average healthcare spending and outcomes by 15 nations taken over 7 time periods of five years each. The topic of health-care reform is a hotly debated matter, seemingly guaranteed to generate discussion in a college of business classroom. Analysis of the data set allows the efficiency of the USA health-care system to be assessed relative to those of other countries. Notes on teaching advanced linear programming applications are included, based on experiences gleaned in the classroom. An informal analysis of alternative software solutions is included.

Introduction

The seminal work on Data Envelopment Analysis (DEA) is generally thought to be "Measuring the efficiency of decision making units" by Charnes, Cooper, and Rhodes which was published in 1978 (Anderson & Hollingsworth, 1997). Over the years, DEA has become an accepted method of identifying the best performing units in a group of similar or identical units. Some applications include: analysis of bank performance (Ganesan, 2009; Paradi, Rouatt, & Zhu, 2011; Hinojosa & Marmol, 2011), comparing hospital pharmacy productivity (Schumock, Shields, Walton, & Barnum, 2009) evaluating and selecting information technology projects (Asosheh, Nalchigar, & Jamporazmey, 2010; Farzipor, 2009), assessing information technology impacts on firm performance (Wang, Gopal, & Zionts, 1996), and assessing equity in baseball player salaries (Howard & Miller, 1993). Indeed, DEA has made its way from researcher-targeted, and practitioner-targeted journals into mainstream textbooks (Lawrence & Pasternack, 2002; Laguna & Marklund, 2005; Anderson, Sweeney, Williams, & Martin, 2008) where it is described as a viable management tool. The technique can be implemented using the standard Excel package although the analysis is not trivial if there are many units to compare; however, specialty software does exist. Although Excel was used in the principal solution approach, various software packages exist, both free and commercially available. In preparing to teach DEA, I identified a set of demographic data regarding the health care expenditures and performance metrics of 15 nations located worldwide but mainly in Europe. This data was obtained from the World Health Organization and it was used in preparing another article (Yasin & Helms, 2010).

In this paper, I describe the process of developing and analyzing the DEA model for the international health-care data. This is of interest to an undergraduate class in management science for three reasons: (1) the relative efficiency of the USA's use of health-care funds is a hotly debated topic, (2) alternative uses for linear programming help communicate and emphasize the usefulness and flexibility of the technique, and (3) using macro-economic data is interesting to the class from the standpoint that it is not hypothetical data engineered for a predetermined outcome.

Analysis

The DEA formulation described in Anderson and others' (2008) management science textbook was used. The following analysis is based on the health-care expenditures and results for a set of 15 countries which is described in detail in the next section. In context, DEA creates a composite country for the purposes of evaluating efficiency of healthcare spending in an engineering sense; that is, efficiency is equal to output divided by input. The actual countries are compared to the composite country, one at a time. When the composite country can achieve the same or better output while requiring less input, then the actual country that is being evaluated is deemed relatively inefficient. The generic formulation is relatively simple:

- Minimize E = the fraction of the actual country's input that is available to the composite country.
- Subject to: Input for composite country $\leq$ resources available for composite country from the actual country being evaluated.
- Subject to: Output for composite country $\geq$ output for the actual country being evaluated.
- Subject to: Sum of the weights used to create the composite country = 1.

- Decision variables: E and the weights used to create the composite country.

In this formulation, the Input for the composite country equals the weighted sum of the inputs for all of the actual countries, in this case 15. Of course, the constraint "Input" must be evaluated for all of the inputs—2 in this case: per capita health care expenditure and amount of urban population.
In this formulation, the Output for the composite country equals the weighted sum of the outputs for all of the actual countries, again 15. The constraint for "Output" must be evaluated for all of the outputs—5 in this case: male and female life expectancies at birth, death rate, mortality rate under age 5 and mortality rate infant. Because bigger is not always better, some management of the constraint signs was required.

One actual country is evaluated per Excel formulation. If a solution with $E < 1$ can be found, the composite country does not need as many resources as the actual country uses to produce the same level of output. Of course, in order to evaluate the relative efficiency of 15 countries, we need to formulate and solve 15 linear programming problems, at least if Excel is used. Effective spreadsheet programming practices can reduce the amount of configuration work involved.

Pre-class

I taught this class for the first time at this university during the 2010 spring semester. In preparing for the course, I selected the topic coverage based on the text and syllabus that was prescribed by the course coordinator. I was surprised to see DEA in the textbook; I was not surprised to see DEA absent in the course topics. This was something of a relief at the time. Later, when I evaluated the student knowledge levels, it seemed that teaching DEA was not an impossibility, from the standpoint of student resources and available time. I determined that I would teach DEA at the next opportunity. Further, I wanted to add a communication component to the curriculum, so I added a report on the analysis and software evaluation to the course.

In the interim, a colleague approached me with a data analysis problem that seemed ideally addressed by DEA. I provided this data for use by the management science students. The data set derives from the World Health Organization and World Bank. Yearly data was averaged for 5 year increments, except for the most recent data, which contained only 4 years. For illustrative and explanatory purposes, a summary table for the USA is shown at the end of this paper in Table 1. A data dictionary follows in Table 2. The complete data set is available upon request.

In the Classroom

I determined the following procedure:

1. Introduce linear programming. This is typically accomplished by introducing the lexicon and smaller examples, that is, examples with only 2 decision variables and 2 or 3 constraints. This allows graphical solution along with a fair review of algebra and systems of equations.
2. Introduce Solver solutions. Standard implementations of Excel are equipped with a powerful Add-in called Solver, created by Frontline, Incorporated. Typically, the class would use Solver to answer several of the simple linear programming problems discussed in item 1. This results in a good review of Excel including topics such as algebraic hierarchy, absolute addressing, use of functions (e.g. SUMPRODUCT), effective spreadsheet programming practices, and Solver itself.
3. Discuss sensitivity analysis, a linear programming topic, and how Excel reports those analyses.
4. Introduce the notion that linear programming is a flexible technique by showing a multi-objective / goal-programming type of formulation. Goal-programming is still not in the course topics list; however, there is a section in the textbook that serves as a reference.
5. Introduce the DEA formulation in parallel with the typically covered, more advanced linear programming problems (e.g. several decision variables instead of 2, incorporate numerous constraints).

Alternative Software Solutions

As part of the course assignment, students were instructed to identify and evaluate an example of DEA software. This process is incomplete at the time of publication; a report will be made during presentation.

Results and Conclusion

This set of students seemed to be more variable in their spreadsheet comfort levels than those students who participated in this course previously. Unusually harsh weather led to an unusually high number of class days missed; thus, the results are incomplete at

the time of publication. Results will be presented during the conference.

References

Anderson, D., Sweeney, D., Williams, T., & Martin, K. (2008). *Instructor's Edition for An Introduction to Management Science: Quantitative Approaches to Decision Making*. Mason, OH: Thomson Southwestern.

Anderson, T., & Hollingsworth, K. (1997). *An Introduction to Data Envelopment Analysis in Technology Management*, Portland Conference on Management of Engineering and Technology, D. Kacaoglu and T. Anderson, eds. 773-778, IEEE.

Asosheh, A., Nalchigar, S., & Jamporazmey, M. (2010) Information technology project evaluation: An integrated data envelopment analysis and balanced scorecard approach. *Expert Systems with Applications, 37(8),* 5931-5938.

Farzipor, S. (2009) Technology selection in the presence of imprecise data, weight restrictions, and nondiscretionary factors. *International Journal of Advanced Manufacturing Technology, 41(7/8),* 827-838.

Ganesan, N. (2009) Data envelopment analysis of state and district cooperative banks in India: Exploratory results. *IUP Journal of Bank Management, 8(3/4),* 37-53.

Hinojosa, M. & Marmol, A. (2011). Axial solutions for multiple objective linear problems. An application to target setting in DEA models with preferences. *Omega, 39,* 159- 167.

Howard, L. & Miller, J. (1993). Fair pay for fair pay: estimating pay equity in professional baseball with data envelopment analysis. *Academy of Management Journal 36(4),* 882-894.

Laguna, M. & Marklund, J. (2005). *Business Process Modeling, Simulation, and Design.* Boston: Prentice Hall.

Lawrence, J. & Pasternack, B. (2002). *Applied Management Science: Modeling, Spreadsheet Analysis, and Communication for Decision Making*. New York: John Wiley & Sons.

Paradi, J., Rouatt, S., & Zhu, H. (2011) Two-stage evaluation of bank branch efficiency using data envelopment analysis. *Omega, 39,* 99-109.

Schumock, G., Shields, K., Walton, S., Barnum, D. (2009) Data envelopment analysis: A method for comparing hospital pharmacy productivity. *American Journal of Health-System Pharmacy, 66(18),* 1660-1665.

Wang, C., Gopal, R., & Zionts, S. (1996) Use of data envelopment analysis in assessing information technology impact on firm performance. *Annals of Operations Research, 66(1-4),* 191-213.

Yasin, J. & Helms, M. (2010) A comparison of health-related expenditures: A multi-country comparison. *Academy of Health Care Management Journal, 6(2),* 1-20.

Table 1: Health Care Data Set Example (USA) Averages over the period.							
Period	Health	Female LE @ Birth	Male LE @ Birth	Urban Pop	Death Rate	Mortality Rate <5	Mortality Rate Infant
1970-1974	7.3	75.2	67.5	73.6	9.3	21.3	18.4
1975-1979	8.3	77.3	69.6	73.7	8.7	16.5	13.8
1980-1984	9.5	77.9	70.7	74.0	8.6	13.9	11.4
1985-1989	10.6	78.3	71.4	74.8	8.7	12.4	10.2
1990-1994	12.8	78.9	72.1	76.1	8.7	10.6	8.6
1995-1999	13.2	79.3	73.4	78.0	8.7	8.9	7.3
2000-2003	14.3	79.8	74.5	79.6	8.5	8.1	6.9

Table 2: Data Dictionary for Health Care Data Set	
Health	expenditure on health care per capita in percent of per capita gross domestic product
Female LE @ Birth	female life expectancy at birth, in years
Male LE @ Birth	male life expectancy at birth, in years
Urban Pop	percentage of population living in urban areas
Death Rate	Number of people per 1000 who die, on average, during the period
Mortality Rate < 5	number of children dying before reaching 5 years of age per 1000 live births
Mortality Rate Infant	number of infants dying before reaching 1 year of age per 1000 live births

TECHNOLOGY-MEDIATED VS. TRADITIONAL COMMUNICATION: BUSINESS STUDENT MEDIA CHOICES FOR RECEIVING COLLEGE-RELATED INFORMATION

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Abstract

Technology has become common place in the daily lives of today's students. However, research is unclear as to how students—particularly in Colleges of Business—use technology to obtain information about academic processes within their institutions. This paper reports the results of a study, administered to 581 business undergraduates at the University of Central Oklahoma, which was designed to elicit information about which media, or non-technology-based (traditional), students use to gather information about such topics as degree information, course enrollment, financial aid, and current events in the college. Overall, results indicate a slightly higher preference for technology-based forms of communication, although face-to-face communication emerged as one of the most frequently utilized means of receiving information. Implications for improving college-to-student communication and for future research are provided.

The pervasiveness of technology in American society is undeniable. It was estimated that in 2009 there were 245 million Internet users in the United States, second in the world only to China (World Factbook, 2011). It was also determined that over 63 percent of Internet users rely on broadband services (DSL, cable, wireless, etc.), an increase of 25 percent from two years earlier (Digital Nation, 2010). Additionally, there were over 286 million subscribers to cellular services in 2008 (World Factbook, 2011), fast outpacing traditional landlines and reflecting an estimated "Cell Phone Only" (CPO) population of between 18-22 percent of the U.S. adult population (Ansolabehere & Schaffner, 2010).

Predominantly younger adults, known in the vernacular as "digital natives" (Economist Intelligence Unit, 2008) have grown up immersed in fast-changing technology and tend to incorporate it into both their personal and professional lives.

Literature Review

Communication technology has perhaps influenced no field more than it has the educational environment. A 2010 survey of college students, faculty, and IT professionals revealed that the majority of college students use social networking to complete team assignments in their classes and consider services such as wireless networks, off-campus connections, and course management systems as "must-have" technologies (CDW-G, 2010). Budden, Anthony, Budden, and Jones (2007) review an entire body of literature which reflects the importance students place on the Internet to their academic careers. In a report by Hayes, Rushman and Walker (2009), 72 percent of students reported a preference for interacting online, rather than face-to-face (F2F), with admission counselors. The importance of technology, particularly social networking, is especially important to graduate students (Benson, Fillippaios, & Morgan, 2010), who recognize the benefits to their career development.

Yet there is conflicting data in the literature as to which particular applications are most used by college students for educational support. A study by Noel-Levitz (2006) showed student purposes for navigating their college websites were: reading profiles of faculty (64%), e-mailing faculty (64%), and reading blogs written by faculty (64%). This study also found that 64% use instant messaging (IM), with the majority preferring snail-mail from their college, making text messaging their "new e-mail" (Noel-Levitz, 2006, p. 3). This finding is supported in part by eROI.com (N.D.), which indicates that "Email is a dying channel, especially among students" (p. 2), and that student preferred means of contact are text messaging (37%), email (26%), social networking IM (25%), instant messaging (11%), and social networking email (11%)…." and that e-mail cannot be considered a "major marketing channel" (eROI.com, N.D., p. 4).

The findings of Irber, Housemann and Hanson (N.D.) also shed light on how students use communication technologies. When asked to respond to the question,

"How would you like your college to communicate with you?" student responses, in descending order, were e-mail, newsletter at home, e-mail newsletter, campus posters, and college newspapers. Students also indicated a strong dislike of cell, home, and work phone contact, preferring instead e-mail, then snail mail, with over 70% desiring F2F contact with an advisor and almost 50% desiring F2F with a professor. Fifty percent also preferred to receive class schedule information mailed to their homes. These findings seem to contradict earlier studies which suggested that students prefer e-mail contact, rather than F2F contact, with their professors (Berge, 1997; Gustafson, 2004; Sherry, 2000, cited in Lightfoot, 2006). In contrast, there is opinion to suggest that applications such as social networking, wikis, blogs, and instant messaging will be the communication technologies that will most improve academics on campus over the next five years (Economist Intelligence Unit, 2008). Thus, it makes sense that "institutions of higher education would seek out ways to use this tool (webs and blogs) in their quest to compete for students, reputation, and resources" and that institutions should "stay focused on the culture, not the technology" in reaching out to students (Hayes, Ruschman, Walker 2009) while providing maximum personalization features for students (Noel-Levitz, Inc., 2006).

Driven by an impetus to provide the most technology-appropriate media for communicating with students in view of the conflicting literature, the College of Business at the University of Central Oklahoma began a program to systematically investigate its students' preferred communication media and then to strategically develop delivery venues utilizing those methods. Given our agreement that a university is "characterized by a multitude of media" and that "communication has to be robust and sound, exact, concise and timely to fulfill its intended mission" (Bakanauskiene, Bendaraviciene, & Kriostoalatisi, 2010), we decided to look to our own students for input for communication development. A pilot survey was conducted in 2008 which tapped the media choices of 129 students enrolled in two CBA core courses: Operations Management and Management Information Systems. Preliminary findings indicated that, contrary to the researchers' expectations, students relied more on traditional, rather than technology-mediated, communication sources for much of their academic information (Wardrope & Miller, 2009). The study revealed a "mixed message" from students who used a variety of traditional sources—including bulletin boards, face-to-face communication with faculty, in-class announcements, and the university's print newspaper—in conjunction with technology-mediated sources such as the college website, the college's Facebook page, e-mail messages, the college's plasma screens, e-newsletters, and faculty websites (Wardrope & Miller, 2009). The pilot served as a precursor to a more comprehensive investigation predicated on a priori research about students' use of communication technology in educational environments that we could extrapolate to our institution. Our research questions were,

RQ #1: ***Do business students prefer technology-mediated or traditional media to receive information about their college?*** and

RQ#2: ***To what extent are student preferences for media choice related to academic major and other demographic factors?***

Method

During the 2010 fall semester, a close-ended questionnaire designed to elicit feedback about business student preferred communication media was distributed to students enrolled in College of Business courses at our university. The instrument was fashioned in the form of a communication audit, an internal research technique used in organizational contexts to ascertain the flow and accessibility of information within that organization, or as Strenski (1984) describes, "a survey of important constituency perceptions and how they mesh with marketing goals" (p. 14). The concept of a communication audit is based on the need to "assess organizational strengths and weaknesses, to measure managerial effectiveness, to uncover problem areas, to identify communication barriers, to increase productivity and teamwork, to establish planning guidelines, and to improve morale" (Giselseman, 1968, p. 13) and is a "snapshot of organizational health" (Vahouny, 2009, p. 36). The researchers applied this concept in an educational context for the purpose of developing best practice procedures for communicating with students.

The instrument contained 18 close-ended items related to students' preferred and actual methods of receiving information about events, policies, degree programs, enrollment issues, and other topics disseminated by the college. It also included questions about demographic information and student level of satisfaction with college information. Eight instructors in four departments in the College of Business distributed the surveys randomly to sections of Introduction to Business, Principles of Finance, Management Information Systems, Legal

Environment of Business, and Principles of Marketing. All of these courses, expect the former, are part of the Bachelor of Business Administration degree core and are required of all business majors. The instrument was administered, in paper form, along with an informed consent form and brief overview of the study during the first 10 minutes of class by the instructors and was collected on-site. A total of 581 respondents provided usable information.

Findings

Demographics

Inasmuch as most of the sample population was derived from business core courses, we expected a preponderance of upper level students majoring in some area of business. It should be noted that non-business majors and undecided majors frequently take College of Business courses to satisfy university core (General Education) requirements, supporting areas for their non-business majors, general or minor electives, or for other purposes. Distribution of majors shows a dispersal across College of Business disciplines, with a significant showing of non-business majors as seen in Table 1.

Table 1
Respondents by Major

Major/Department	Respondents/Percent
General Business /Unspecified Business	130 (22.4%)
Non-Business	109 (18.8%)
Accounting	74 (12.7%)
Management	60 (10.3%)
Finance	43 (7.4%)
Marketing	29 (5.0%)
Information Systems /Operations Management	22 (3.8%)
Economics /International Business	22 (3.8%)
Undecided or Not Specified	92 (15.8%)

Full-time students constituted the majority of the sample (528 or 91%). The respondents were seniors (110 or 19%), juniors (198 or 34%), sophomores (72 or 12%), and freshmen (170 or 29%). Three graduate students responded to the survey. Males and females, respectively, accounted for 317 (55%) and 236 (41%); four percent did not indicate gender. The majority of students were age 21 or younger, followed by 21-25, 26-40, and 41 or above. A majority of respondents (374 or 64%) were married. Sixty-three percent (364) reported being currently enrolled in at least two business courses.

This study also investigated the extent to which students spent time on campus, how far they lived from campus, how much of their course load was online versus traditional, and how many hours they worked per week as these factors could affect their media choices. We determined that 496 students or 85.4% of our sample, were not taking any online business courses at the time the survey was administered, and that almost the same number (495) reported taking no online business classes during the previous semester. These totals do not account for any online courses that students may have taken or are taking from outside the College of Business and do not appear to be consistent with the number of online courses taught by the College, which offers numerous sections of core courses each semester. Table 2 reports a breakdown of hours students reported spending on campus or virtually on campus.

Table 2
Respondents' Number of Hours Per Week on Campus

Hours	Physically On Campus	Virtually On Campus
12 or more	415 (71.4%)	140 (24.1%)
6-11 hours	112 (19.3%)	101 (17.4%)
5 or fewer	30 (5.2%)	301 (51.8%)
No response	24 (4.1%)	39 (6.7%)

A majority of students reported holding jobs. Almost half (271 or 47 percent) indicated employment of up to 20 hours per week, while 208 students (36%) reported employment of 21-40 hours per week. Forty-five (7.75%) indicated employment of over 40 hours per week. These data are consistent with trends at the University of Central Oklahoma, which is largely a commuter-populated institution located in a large metropolitan workforce area. Student commutes were partially reflected in the distance they reported traveling to the university, with 328 students living 5 miles or less from campus (including those housed on-campus) and the remainder commuting more than five miles. One hundred and two students indicated a commute of over 20 miles. Moreover, over 70 percent of respondents indicated that their classes started before 12:00 p.m.; only 6.3% reported classes starting after 5:00 p.m., with the remainder starting in the afternoon.

Media Usage. The survey's first question asked students to indicate how often they used technology-based and non-technology based sources to obtain college information. A Likert scale from 5 "always" to 1 "never" was used to calculate means for each

item, shown in Table 3, which depicts a mixed usage of technology and non-technology media.

Table 3
Student Media Choices for Obtaining College Information

Media	Media Type*	Mean
UCONNECT* *	T	4.18
University Website	T	3.80
Instructors in Class	NT	3.78
E-Announcements	T	3.14
Instructors 1-1	NT	2.60
Professor Websites	T	2.54
Depart. Websites	T	2.25
Academic Advisors	NT	2.19
Plasma Screen #1	NT	1.94
Bulletin Boards	NT	1.89
Student Meetings	NT	1.86
Career Serv. Web Site	T	1.63
Campus Newspaper	NT	1.51
Department Chairs	NT	1.36
Plasma Screen #2	NT	1.27
Foundation Website	T	1.20
College E-Newsletter	T	1.17
Dean's Office	NT	1.15
Twitter	T	1.07
Internship Website	T	1.02

*Techology mediated/non-technology mediated
**UCONNECT is a portal product that integrates with web based products, our CMS, and our ERP campus system. It allows students to access school administrative, event, news, and class related materials.

Because all majors across the college were sampled, we were curious to see how each group of students would vary in their usage of technical and non-technical media sources. Thus, we collapsed responses into two composites—*technology and non-technology*—and compared by major. There were nominal differences among major groups as shown in Table 4. All but two major groups—Management Information Systems and Marketing—generally preferred technology-mediated means over non-technology mediated.

Table 4
Use of Media Type by Student Major

Major	Tech Composite Mean	Non-Tech Composite Mean
Accounting	2.08	2.02
General Business	1.74	1.71
Economics	2.38	2.11
Finance	2.23	2.14
HR Management	2.30	2.20
International Bus.	2.16	1.97
MIS	2.51	2.58
Legal Studies	2.28	1.66
Management	2.09	1.91
Marketing	2.03	2.11
Operations Mgmt.	2.20	1.94
Prof. Golf Mgmt.	2.13	2.00

Next, students were queried about the perceived relative ease of accessing information about various academic and academic-related processes on campus. A Likert scale (5=always easy to 1=never easy) was used to characterize these data. As Table 5 indicates, the information most readily accessed was related to more immediate, pragmatic issues related to enrollment.

Table 5
Student Reported Ease of Accessing College Information

Information Topic	Mean
Final Exam Time	4.17
Drop/Add Course Policies	3.96
Degree Requirements	3.77
University Activities	3.70
Student Organizations	3.35
Financial Assistance	3.08
Department Activities	3.01
Scholarships	2.97
Guest Speakers	2.96
Career Opportunities	2.95
Internships	2.72
College Activities	2.65
Faculty Accomplishments	2.62

The next series of questions centered around student media choices relevant to obtaining information about a variety of academic topics listed on the survey instrument. Each item was prefaced with the question, "When you need to know about ____, how likely are you to use (each media type)?" Students were asked to indicate their likelihood of using different types of media to access information about 12 college topics. Again, we collapsed the media into

two categories and calculated an overall mean for each. This information, presented in Table 6, shows technology-mediated sources being used more likely than non-technology sources, although in some cases differences were negligible.

Table 6
Respondents' Likelihoods of Media Choice Related to Desired Information

Desired Information	Tech. Mean	Non-Tech. Mean
Courses Scheduled Each Semester	3.23	2.85
Class You Are Currently Taking	3.31	2.85
Scholarships	2.98	2.78
Student Organizations	3.03	2.77
Guest Speakers	3.27	3.22
Faculty Accomplishments	2.73	2.67
Final Exam Times	3.22	3.01
Drop/Add Policies	2.94	2.74
Financial Aid	2.99	2.64
College of Business Departments	2.99	2.81
Internships	2.98	2.81
Career Opportunities	3.01	2.84

The final substantive part of the survey asked general questions about student satisfaction with communication in the College of Business and which technology-based methods they used most frequently to access information. Using a five-point Likert scale (5=very satisfied, 1=very dissatisfied), we found moderate satisfaction with communication: The average responses for **satisfaction with the amount of information** was 3.28, for **satisfaction with the quality of information** was 3.26, and **satisfaction with the methods of receiving information** was 3.28. When asked how often students used various media of communication to receive information, face-to-face communication emerged as the most frequently used, as reported in Table 7, a stark contrast to other data in the study which suggested an overall preference for technology-mediated methods of communication.

Table 7
Most Frequently Used Communication Media

Media	Mean
Face-to-Face	2.25
Campus Wireless Network	2.11
Computer Labs	2.09
Home Computers	2.01
Smartphones	1.85
Social Networking (Facebook, Twitter)	1.80

Conclusions

This study highlights the communication habits of our primary constituent group, our students. The information is of great value for college strategic planning purposes as we develop our outreach programs to the greater academic community.

From a research perspective, the data confirmed our initial perceptions of the complexity of student media selections. Our data suggests that the answer to Research Question #1, Do business students prefer technology-mediated or traditional media to receive information about their college, is a moderate preference for technological over traditional means. This conclusion, however, is seemingly compromised by the single finding that students use face-to-face communication more than they use their technology-assisted access (Refer to Table 7). Moreover, social networking venues such as Facebook and Twitter, fared poorly compared to more traditional means of information dissemination. It may be that students are not as aware of their university's presence on these media, or that it is a matter of convenience—students use face-to-face communication because they are in class and access to the instructor is immediate. It would be helpful to know student justification for their media choices to clarify our mixed findings. It would also be instructive to measure their knowledge of the media available to them—perhaps they are not using the College's Facebook page because they do not realize it exists.

Research Question #2 asked, To what extent are student preferences for media choice related to academic discipline and other demographic factors. It can be inferred, given the preponderance of traditional students in this study, that factors such as age may account for a stronger preference for technology-mediated communication. Inasmuch as most of our population commutes to school and are employed, it is intuitive that they would rely on technology more than traditional means of interaction. Academic degree appears to be less a factor, as little difference seems to exist between most groups. Interestingly enough, the Management Information Systems group reported a higher dependence on non-technical means of

communication than technical. It may be that within all business disciplines, because of their common core and because of student vocational interests, technology is a common denominator that every student, despite their major, relies on equally. It should be noted that not all departments and information providers use both technology-mediated and non-technology mediated media equally, which will also reflect in student preferences for obtaining information, as they will logically seek information where they know it will exist. More research into this issue, perhaps using learning style theory, would clarify the differences and similarities among students majoring in all areas of business.

The importance of keeping pace with student media habits cannot be understated. The implications for college administration are staggering, especially in light of recruitment and retention mandates. Moreover, understanding the careful balance between technology-based instruction and traditional instruction may be of critical importance as well, as our universities continue to offer programs to students of all demographic backgrounds. The fact that face-to-face communication emerged over technology-based forms of communication requires further investigation, especially since students report only moderate satisfaction with other preferred, technology-based forms. In short, we need to know the thinking process behind student answers to our questions as we continue to unravel the complexities of technology use in the 21st century university.

References

Ansolabehere, S., & Schaffner, B. F. (2010). Residential mobility, family structure, and the cell-only population. Public Opinion Quarterly, 74: 244-259. Available: http://poq.oxfordjournals.org/content/early/2010/04/21/poq.nfq018.full.pdf+html

Bakanauskienė, I., Bendaravičenė, R., & Krikštolaitis, R. (2010). Empirical evidence on employees' communication satisfaction and job satisfaction: Lithuania's University case. *Management of Organizations: Systematic Research, 54,* 21-36.

Benson, V., Filipaios, F., & Morgan, S. (2010). Online social networks: Changing the face of business education and career planning. *International Journal of e-Business Management*, *4*,(1), 20-33.

Berge, Z. (1997). Computer conferencing and the on-line classroom. *International Journal of Educational Telecommunications 31,* (1) 3-21.

Budden, C. B., Anthony, J. F., Budden, M. C., & Jones, M. A. (2007). Managing the evolution of a revolution: Marketing implications of Internet media usage among college students. *College Teaching Methods & Styles Journal* (Third quarter), 3, (1), 5-10.

CDW-G (2010). 21st Century Classroom Report. Available: www.cdwg.com/21stcenturycampus.

Digital Nation (2010). 21st Century America's progress toward universal broadband Internet access: An NTIA research preview (February). U.S. Department of Commerce. Available: www.ntia.doc.gov.

Economist Intelligence Unit (2008). The future of higher education: How technology will shape learning. *The Economist*.

eROI (N.D.). *Student survey: How students communicate online*. Available: http://www.eroi.com/resources/Q408_student_survey.pdf

Gieselman, R. D. (1968). Applying survey methods to employee communication. *Journal of Business Communication, 6,* (1) 13-23.

Gustafson, K. (2004). The impact of technologies on learning. Planning *for Higher Education, Society for College and University Planning*,*32*,(3), 37-43.

Hayes, T. J., Ruschman, D., & Walker, M. M. (2009). Social networking as an admission tool: A case study in success. *Journal of Marketing for Higher Education, 19,* 109-124.

Irber, S., Hausman, S., & Hasson, C. (N.D.). Skyline college media preferences survey. Available: http://skylinecollege.net/facstaff/plans/assets/Media%20Preference%20Survey%20vr2.pdf

Lightfoot, J. (2006). A comparative analysis of e-mail and face-to-face communication in an educational environment. *The Internet and Higher Education, 9,* 217-227.

Noel-Levitz, Inc. (2006). Engaging the "social networking" generation: how to talk to today's college-bound juniors and seniors. Available: https://www.noellevitz.com/NR/rdonlyres/425D56C3-9ACD-4A90-9782-F70ED7AC3CF2/0/EExpectationsClassof2007.pdf.

Sherry, L. (2000). The nature and purpose of online discourse: A brief synthesis of current research as related to the WEB project. *International Journal of Educational Telecommunications,6,* (1) 19-51.

Strenski, J. N. (1984, Spring). The communications audit—Basic to business development. Public Relations Quarterly.

Vahouny, K. (2009, July/August). Get started on your communication audit. *Communication World,* 35-37.

Wardrope, W. J., & Miller, L. (2009). *Practicing what we teach: A communication audit of a college of business.* Paper presented at the annual meeting of the Association for Business Communication-Southwest United States, Oklahoma City, OK.

World Factbook (2011). *North America*. Available https://www.cia.gov).

NOTES

Using Social Network Analysis to Leverage the Industrial Advisory Board for Regional Institutions: Program Reflection and Improvement

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Abstract

In this paper we take the position that the Industrial Advisory Board (IAB) for undergraduate programs in Computer Information Systems (and other IT-related disciplines) is a key and vital ingredient for the program's long-term viability. We propose an analytical framework (Social Network Analysis) and a theoretical framework (Actor Network Theory) that can be used to understand, manage, and sustain the IAB. Social Network Analysis (SNA) is presented as a visual and statistical tool for understanding the centrality of advisory actors in the social network of the program's constituents and stakeholders. Actor Network Theory is discussed as a theoretical basis for understanding the unique qualities of the Computer Information Systems discipline, which is concerned with the emergent phenomenon that arise due to the interaction between technical and organizational systems. Actor Network Theory is also used to understand why skills, techniques, and knowledge can serve as actors in the social network. Future research directions which utilize the analytical and theoretical framework are discussed.

Introduction

In a dynamic field such as Computer Information Systems, higher education programs must routinely undertake processes of continuous program improvement. This of particular importance as CIS programs must impart vital skills and techniques to their undergraduates. Of the vital elements required to sustain an effective CIS program – qualified faculty, educational facilities and technology, procedures for regular program assessment, etc. – one of the more important elements, and often over-looked, is the Industrial Advisory Board (IAB). CIS programs need the IAB's input as a means of reflecting on the program's attainment of its educational objectives. In this paper, we are concerned in attaining and sustaining effective engagement with the IAB as they represent an important gauge of the quality of a program.

One means by which we can understand the IAB's role is to consider the process of ensuring high-quality educational objectives – typically the successful entry of graduates into the profession – from a systems perspective. In this case, we propose that the IAB is a key conduit by which a CIS program understands how their activities in the academy are co-created with those in the marketplace of industry. This mutually constructive process is illustrated in Figure 1.

Figure 1
Relationship Driving the Need for a Healthy IAB

For a skills- and technique-heavy discipline, such as Computer Information Systems (and other similar IT-related disciplines), the demand for graduates creates a marketplace, which the academy facilitates. As CIS programs engage in processes of continuous program improvement, a strong IAB is necessary to ensure that the CIS program truly and effectively understands the symbiotic relationship between the marketplace and the academy.

This paper examines several issues related to the importance of the IAB: the need to establish, account for, account to, understand, manage, and sustain a strong, effective, and helpful Industrial Advisory Board. Of particular interest in this paper is the case of Computer Information Systems undergraduate programs. Essentially, the task is to maximize the effectiveness of the IAB. We propose that Social Network Analysis is among the better tools available to sustain the association between the marketplace and the academy.

Towards these ends, the paper proceeds in the following manner. First, we discuss the historical context and importance of the Industrial Advisory Board (IAB). Next, we focus on the needs of the regional institution versus the metropolitan institution. This is followed by a discussion of the expectations of the advisory board and the desirable/key attributes that an IAB advisor meet. Next, the importance of finding a good mix of intra- and extra-regional advisors is stressed. We then discuss issues related to maintaining the focus and sustainability of the IAB. This is followed by a section on the use of Social Network Analysis (SNA) as a tool to maintain and sustain the effectiveness of

the IAB. We propose that an SNA of the IAB promotes continuous program improvement, which in turn leads to a reflective and learning-oriented program assessment and evaluation approach. We conclude by discussing future directions for the use of SNA.

The Importance of the Industrial Advisory Board

The IAB should consist of a number of leading professionals, dispersed endogenously and exogenously to the institution, who are able to represent trends and sentiment in the discipline's practitioner and industrial component. Furthermore, the endogeny and exogeny of the IAB would also extend to concerns of intra- and extra-regionality. The need for this dispersion of proclivity is reasoned in Table 1.

Table 1
Regionality, Exogeny, and Endogeny of IAB Members

	Exogeny	**Endogeny**
Intra-regional	CIO, CTO, CSO for local companies, typically SMEs.	CIO, CTO, CSO or lead staff in IT for the institution
Extra-regional	CIO, CTO, CSO for local companies, typically SMEs.	CIO, CTO, CSO or lead staff in IT for the system of institutions to which the home institution belongs (not always applicable)

The IAB is important to an institution for the value it provides to the academic programs that they serve. The provisions of and value added by the IAB are listed in Table 2.

Table 2 Focusing the Values, Benefits and Provisions of the IAB

Value-Added by the IAB	**Benefits and Provisions**
Leadership	For the program, curriculum, practicum, internships, etc.
Promotion	Liaison and advocacy at the intra- and extra-regional level
Resource Development and Support	Funding, equipment, opportunities, access, donations, scholarships and grants, technology funding, and human capital
Professionalization	Aiding and guiding in students' transition towards a professional career
Curriculum Development	Suggests what currency in relevant skills and competencies are required
Public Relations	Institution and program promotion; graduate mentorship, development and promotion; networking

Our primary concern with an Industrial Advisory Board is in regards to our ability, as educators, to understand whether the match between the skills, techniques, and knowledge that we teach in our programs are (a) relevant to practice and; (b) meet the standards of rigor necessary to provide value to practice. Of particular importance and interest is capacity of the IAB to attune the CIS programs to the needs of local industry. Thus, the faculty in a program which engages and enlists the support of an effective IAB is a faculty that forestalls the irrelevance of outdated and unwanted skills and training. In this sense, the IAB grounds and focuses the discipline. We undertake the vitally necessity of human capital refreshment and replenishment by including the IAB in an integral manner.

Regional vs. Metropolitan Institutional Concerns

With respect to IAB design and strategy, it is not likely that a one-size-fits-all approach will suffice the needs of all institutions. Once variable of concern is the geographic nature of the institution: is this a regional or metropolitan school? The importance of this question is not to focus on the cultural and demographic variety between regions, but rather focus on where the imperative lies in the relationship between academic programs and the IAB. We propose that the imperative lies with the institutions in the case of regional schools and with industry in the case of metropolitan schools. We hold this position as regional institutions: a) are faced with sparse opportunities for industrial interaction; b) typically have a more pedagogical focus in their mission; and c) are remote to the typical power centers of industry. We make these assertions based on our own observations over many years spent in a variety of institutions. As we speculate on different motivations for developing an Industrial Advisory Board, we turn our focus on the qualities of and expectations of the IAB members.

Expectations and Desirable Attributes of the IAB Member

As the IAB, according to our definition and model, accords their advisee institution and programs multiple roles, it is beneficial to discuss and examine which of these roles are critical. Foremost, the IAB serves as an intermediary between the market and the academy such that the IAB may advocate in both directions (see **Error! Reference source not found.**). However, the advisee institution must develop key expectations from the IAB in order to derive maximum benefit from the association. We continue to focus on three of these expectations: accountability, focus, and strategic direction.

Accountability

The advisee institution and programs should seek mechanisms for accountability through the IAB's oversight. The accountability we are concerned with relates to the efficacy of the institutional and program learning outcomes and program objectives in meeting the needs of industry. Ideally, this accountability is bi-directional in that the IAB is consistently engaged to provide their vital feedback role. In this sense, the ideal relationship is mutually reinforcing and symbiotic.

Focus

Accountability then provides both parties the focus required to maintain and sustain programs and IAB oversight. The IAB becomes an important conduit in a feedback loop where students' skills, technical competency, and knowledge are set against the real needs of practice and industry. This also helps to establish regional influence in the need for skills and also corrects excessive interest in trends which may be irrelevant to industry. This is not to say that the academy should not lead through experimentation, rather, this is to say that such endeavors should be accorded in appropriate proportion and measure.

Strategic Direction

With accountability and focus, the IAB and the institution are positioned to shape the strategic course of the program in order differentiate and distinguish the program from others. Thus, the IAB's oversight may lead to the discovery of appropriate niche areas in which specialization is desirable to local industry and practice. We have anecdotal evidence in some areas where seemingly dead technologies, such as COBOL, are kept alive due to regionalized demand.

Desirable Attributes

In addition to the obvious desire for IAB members who are leaders and experts in their field, there are other individual qualities that are also important. *Influence* is certainly important as influential individuals are able to bring various stakeholders together. This influence can be manifested through inter-personal traits such as: involvement, excitement, spirited and unflappable commitment, and motivation in general. Concomitant to influence are *Experience* and *Prestige*. In our experience, those with experience and prestige are those who are typically able to wield influence. Thus, through renown, knowledge, and expertise, these individuals enjoy and wield influence. However, perhaps above all else, this influence needs to be made relevant and applicable via representation within the field. Thus, the influential IAB member is most effective when their influence lies within the sanction of discipline-specific, recognized bodies and outlets.

Sourcing the IAB

Standing up an effective AIB is a potentially difficult endeavor at first as it is likely that faculty in a department may not originally be from the area – this will vary depending on the composition of a given department's faculty. However, there are general concerns in sourcing the IAB regardless of the endemism of the faculty to the region.

Working the Network

The development of a professional network is vital for all – students, educators, practitioners, administrators, the community at large, and more. Therefore, an institution must remain vigilant and persistent in the utilization of the social networks which are vital to professional life. The graduates, associates, and boosters of the institution are an obvious starting point, such that many extant relationships might be leveraged.

Compel, Persist, Initiate

We have previously posited that the imperative to develop a strong IAB lies with the regional institution, whereas the imperative may lie with industry in a metropolitan institution. In the case of the regional institution, there are a number of concerns. First, the regional institution must determine what will motivate or compel a prospective IAB member; what are the compelling arguments and incentives to be made? As with any relationship-building challenge, the regional institution must remain persistent with the prospective IAB member by engaging in frequent follow-up. Lastly, the regional institution will want to hold a first meeting where they project the highest possible impression for their prospects. Additionally, there are concerns related to the intra- and extra-regional challenges inherent in developing the networks necessary to cultivate prospective IAB members. Table 3 examines the intra-regional and extra-regional

concerns related to developing a prospective IAB advisor.

Table 3 Concerns for Finding IAB Advisor Prospects across Social Networks

Intra-Regional	Extra-Regional
• Face to face relationships • Word-of-mouth • Community leaders • Ties to institution • Business and organizations who can benefit from your program's expertise • Onsite activities at businesses • On campus	• Rely on networks • Rely on graduates • Rely on reputation • Rely on perceived unique and distinctive qualities of your program

Inherent Sustainability of the IAB

Whilst the task of finding and commissioning the Industrial Advisory Board has been presented here as challenging, we propose that the challenge of sustaining the IAB is even greater. We have observed this to be so as the IAB may lack the goal-oriented purposing which typically accompanies single projects; the IAB's oversight should be ongoing. Furthermore, IAB membership and member participation is not likely to be static: IAB advisors will come and go for a variety of reasons. Thus we describe two challenges to IAB sustainability: (1) the challenge to sustain engagement and, (2) the challenge to maintain a core body of advisors in the face of attrition. We propose a model of IAB advisor participation and interest in Figure 2, which is not based on empirical data, but rather based on the impressions of the authors in their personal experience. Therefore, the values in Figure 2 are offered to illustrate a notional sense of our collective experience – whether these experiences are unique to our particular situations (across several institutions) is unknown and untested.

Based on our model in Figure 2, we propose that the innate qualities of individuals who most likely fulfill our optimal requirements for ideal IAB advisors are perhaps those who enjoy a challenge. Thus, rapid enthusiasm is likely in the run-up to developing a successful IAB. However, our experience has shown that the oversight and maintenance required to sustain the IAB are often not as appealing and interest wanes. Our concern here is that, as an important stakeholder and constituent for an institution's programs, the waning, dormancy, and dissolution of an IAB is a threat to the viability of a program's efforts towards sustainable and continuous improvement.

A succession of short IAB life-cycles, such as presented in Figure 2, are detrimental to an institution and its programs as the effort to stand up a new IAB is considerable. Furthermore, a wealth of longitudinal, institutional knowledge likely evaporates each time an IAB is allows to dissolve. We acknowledge the existence of "symbolic" IABs, which may appear to function over a long duration, but are actually dormant for practical purposes. Our concern is how an institution might creating a sustainable input from the IAB, rather than an engagement model which vacillates between precipitous highs and rapid declines towards dormancy in quick succession. We propose that what is necessary is a means of both understanding and managing the IAB as a social network. For this we move to the next section where we propose a Social Network Analysis approach to the problem of managing a sustainable IAB.

Monitoring and Managing with Social Network Analysis

We propose that the networks used to commission an IAB are dynamic such that the individuals whom we selected for inclusion further connect the institution, the program, the faculty, and the students to a much wider inter-network of social connections. Thus, the "pull" of those networks may influence the efficacy and reliability of any given advisor and by extension, the cohesion of the IAB. Thus, by joining the institution, program, the faculty, and the students to the collective inter-network of the IAB, the complexity of the entire topology increases. We propose that the tools associated and facilitating Social Network Analysis constitute an appropriate IAB management approach.

Social Network Analysis Explained

Social Network Analysis (SNA) is a visual measuring, graphing, and analysis toolset designed to measure the interdependency and centrality between nodes, typically people, in a social network. Of importance to the problem of IAB sustainability, our interest in this solution approach lies within our need to track, monitor, and influence the perceived and actual value that our IAB advisors derive from their social network – which now extends to the institution.

There is a long, and increasingly engaged, history of Social Network Analysis in the humanities (Cross et al., 2002; Cross and Parker, 2004; Tichy et al., 1979;

Wasserman and Faust, 1994). Increasingly, SNA has become compelling as a means of visual and statistical reasoning in a number of problem spaces with a strong social/human component. Specifically to the Computer Information Systems discipline, SNA is an important approach by which we might understand certain organizational problems (Cross et al., 2002). Furthermore, it is possible to conceive of the complexity of the IAB network from the perspective of a boundary problem: how do we manage the influence of the IAB advisors' networks where they extend beyond the boundary of our own concern? However, by its nature, SNA is able to entertain questions pertaining to boundaries and subsets of the network – it readily facilitates subdivisions for any number of perspectives.

The power and allure of SNA is the ability to perform both visual and statistical analysis in pursuit of answers to questions pertaining to "who knows who and why?" Figure 3 shows a wide-view of a social network analysis graph wherein visual associations and clustering is immediately revealed, merely through visual analysis.

Beyond the compelling results obtained from simple visual analysis there are other statistical and graph metrics available in SNA. Using tools such as UCINet, Pajek, ORA, R, SocioMetrica, and others, the social network analyst is concerned with measures of centrality, which determine the relative importance of a node to the integrity and function of the network. SNA borrows from graph theory and network theory for its logical and mathematical constructs. Our interest in centrality is the degree to which it can tell us about (Cross and Parker, 2004):

- **Between-ness** – A node's situation between centers of influence in the network
- **Bridge** – The criticality of a node such that removing the node severs one or more connected networks
- **Proximity** – For a given node, what is its power and information distance relative to other nodes or branches/sub-networks in the network?
- **Degree** – For a given node, what is the sum total of ties to other nodes. We consider these ties as being strong, weak, or absent.
- **Cohesion** – For a given node, do other adjacent nodes cluster on, or gravitate towards, this node?

Process and Procedure

Cross and Parker (2004) provide a general outline for how a Social Network Analysis is typically conducted. We summarize this process here to illustrate how to go about using SNA to build, monitor and manage the IAB. The premise of the Cross and Parker (2004) procedure holds that the revelations of the SNA provide palpable benefits: informal relationships between actors (nodes) exert critical influence on work and innovation; the appropriate level of connectivity in well-managed networks has a substantial impact on an actor's performance, learning, and innovation; the ties between actors in the network are made explicit. Table 4 provides a summary of the Cross and Parker (2004) procedure.

Table 4 Cross and Parker (2004) SNA Procedure

Step	Actions	Remarks	Outputs
1	Identify a strategically important group (the IAB, extant or Prospective)	Typically, the limit would be 250 individuals	List
2	Assess meaningful and actionable relationships	This is obtained by using a confidentia l survey	Relationships revealing collaboration. information-sharing potential, rigidity, supportiveness, etc.
3	Visually analyze the results	The spatial distribution s of nodes and arcs/edges is revealing	A graph of the network
4	Quantitative ly analyze the result	Centrality measures	Degree, between-ness, etc.
5	Create meaningful feedback sessions	Interviews and workshops	Documentation
6	Assess progress and effectiveness	Follow-up 6-9 months subsequent to SNA	Develop propositions, hypotheses, interventions, treatments, etc.

Theoretical Basis of the Solution Approach

We must consider that SNA, based on graph and network theory, is meant to measure and visualize centrality in a network of actors. However, we must

revisit our motivations for using SNA to better understand centrality. If we revisit Figure 1, we must ask, what exists, if anything, between "marketplace" and "academy?" Whereas our IAB advisors represent the profession and discipline, we, as educators who run the programs which produce graduates, must measure the success of these programs with respect to their goals. Generally, these goals are related to the disposition and "state" of the graduate in their initial years of matriculation from the program and into industry. Thus, our measure of success is the degree to which the graduate was able to successfully, gainfully, and ruminatively, enter into the marketplace of employment and compensation for their skills. Therefore, we, as the educators who facilitate the running of the programs, must involve the IAB into the network with actors that are not human: the program, the curriculum, skills, techniques, knowledge, etc. These are actors in the network in that they exert influence on the human actors in the network. By its nature, SNA does not address these non-human nodes in the network, this is where Actor-Network Theory can be used.

If we can accept the premise that an SNA that is useful for the purposes of managing the IAB requires the consideration and inclusion of concepts into the network, then we may also consider Actor Network Theory (Callon, 1986; Latour, 1986) as a means of enhancing SNA. As there is a marketplace for our graduates' skills, and one important measure of the success of our programs is the ability for our graduates to "sell" in that marketplace, then we may accept that these skills, and their contributories and antecedents, exert influence within the network. Thus, in our use of SNA, we may also consider the useful distinctions available in Actor Network Theory (ANT): the concept of the heterogeneous network; it's composition of both social and technical parts; and the cognitive equality of the social and technical actors. This is compelling as the context for our use of SNA, specific to the experiences of the authors, is that of the Computer Information Systems discipline. Given the emergent and inter-disciplinary history of the CIS discipline, a social network model that considers that both technical and social actors can equally interact is attractive, useful and appropriate.

The Road Ahead: Future Research Directions

In this paper, we have taken the position that SNA is a useful tool that can be used to manage the IAB, which is in itself a useful "tool" to facilitate ongoing processes of continuous program improvement. With this theoretical and analytical framework – ANT and SNA - in place, we propose to follow the Cross and Parker (2004) procedure and conduct, first, our own SNA, and then subsequently a collection of SNA case studies with other institutions. We feel that we can learn more not only about our own history of IAB utilization, but discover wider patterns about the nature and disposition of our discipline at large through the use of SNA.

Another important goal for future research is to test the efficacy and validity of tying the precepts of ANT into SNA. It may seem counter-intuitive to explore the agency of nonhumans in a network designed to manage human members of the IAB, but the IAB is meant to act as a fulcrum in the industry/academy continuum. For this reason, we have to understand how the industry exerts its influence on the IAB, the program, the faculty and the students. Consider, for instance, recent phenomenon such as "Web 2.0" and social networking websites such as Twitter and Facebook. Do what degree have members on the IAB been influenced by these technological innovations to the point that the sheer forceful and pervasive nature of these phenomenon left only an obvious choice of adoption for the IAB member? Where does the agency lie here? We hope that taking an ANT perspective during the course of our SNA field work will help to understand the agency of technology and to perhaps add to the body of knowledge concerning both SNA and ANT.

Conclusion

In this paper, we have proposed that the utilization and management of the Industrial Advisory Board, with the ultimate aim of managing its sustainability, is of paramount importance. In our own experience, we have found that many IABs are not sustainable as they haven't been managed properly. While this may not be the case universally, we suspect that the ephemerality we have observed in our own IAB experiences may be a widespread phenomenon worthy of additional study. We have proposed that Social Network Analysis is an appropriate analysis approach used to understand, manage, and sustain the IAB. Utilizing the Cross and Parker (2004) procedure, we propose to use the theoretical and analytical framework of ANT and SNA in order to graph our own IAB's social network as well as that of a representative sample of other regional institutions. We are interested in the geographical aspect of institutions, as we have found that the impetus for action in regional institutions lies with the institutions and not with the influential,

experienced and prestigious candidates whom we desire to be our IAB advisors. While the use of SNA is not new as a means to understand and address problems of a socio-technical nature, we do not know of other studies that have used our proposed theoretical and analytical framework in order to study the sustainability of the IAB. Therefore, we anticipate that findings from our future research endeavors will provide an analytical context that will assist us in our primary goal: to build a viable and sustainable IAB that allows our programs, and the students we graduate from these programs, to flourish.

References

Callon, M. (1986). "The Sociology of an Actor-Network: The Case of the Electric Vehicle." Mapping the Dynamics of Science and Technology. Callon, M., Law, J. and Rip, A. (Eds). Macmillan Press, London: 19-34.

Cross , R., Parker, A. (2004). The Hidden Power of Social Networks, Harvard Business Press.

Cross, R., Borgatti, S.P., Parker, A. (2002). Making Invisible Work Visible: Using Social Network Analysis to Support Strategic Collaboration, *California Management Review*, 44(2), 25-47.

Latour, B. (1986). 'The Powers of Association'. Power, Action and Belief. A new sociology of knowledge? Sociological Review monograph 32. Law, J. (Ed). Routledge & Kegan Paul, London: 264-280.

Marshal, J.A. (1999). Maximizing Your Industrial Advisory Board, *Journal of Industrial Technology*, (15:2), February-April.

Maxim, B.R. (2004). Closing the loop: assessment and accreditation. *Journal of Computing Sciences in Colleges , 20* (1), 7-18.

Rooney D.M., Puerzer, R.J. (2002). "The smaller engineering school and its industrial advisory board: an effective partnership?" 32nd Annual Frontiers in Education (FIE'02), pp.16-21

Tichy, N.M., Tushman, M.L., Fombrun, C. (1979). Social Network Analysis for Organizations. *The Academy of Management Review*, 4(4), 507-519.

Wasserman, S. and Faust, K. (1994) Social Network Analysis: Methods and Applications. Cambridge University Press, Cambridge.

Figure 2 Sustaining IAB Interest

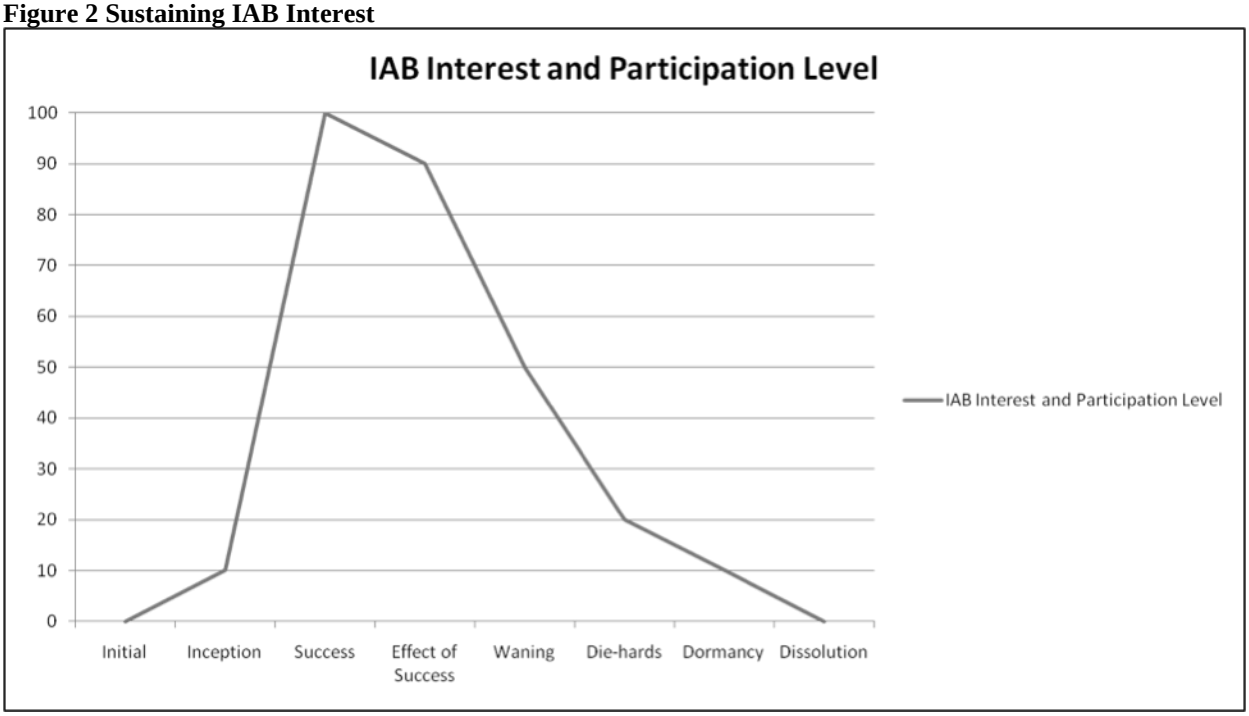
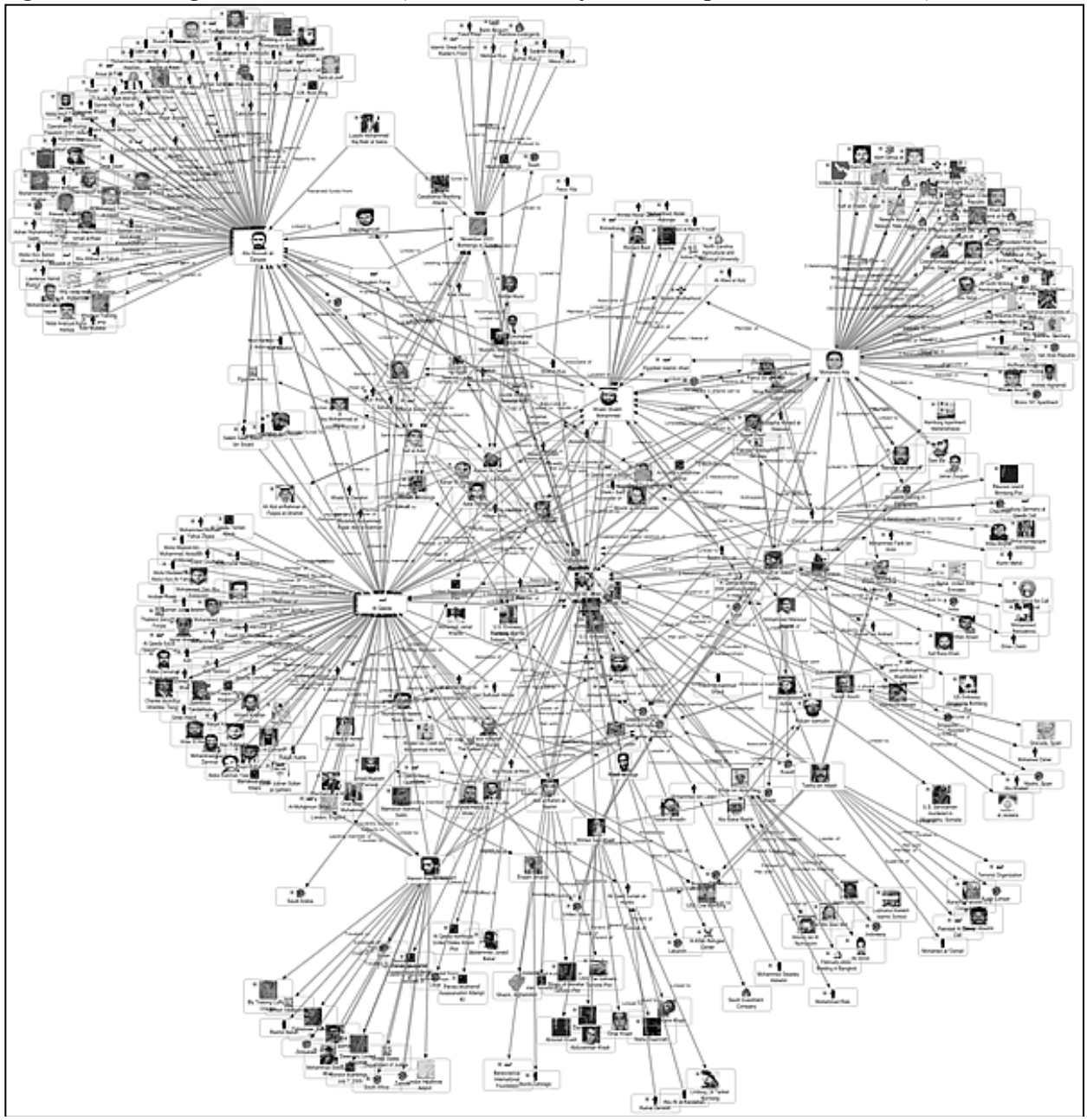


Figure 3 Visualizing the Social Network (FMS Advanced Systems Group – Sentinel Visualizer)



NOTES

Website Characteristics And Their Influences: A Review On Web Design

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Introduction

The research reported concerns web sites designed primarily to sell products directly to customers. In this context, studies describe different characteristics related to websites such as trust (Wing 2006; Mcknight 1998; Robin 2003; Gefen 2003; Wakefied 2004), satisfaction (Mckinney 2002), website usability (James 2007;Venkatesh 2006; Palmer 2002;David 2009), website quality (Andrea 2005), E-loyalty (Mithas 2006; Cyr 2008), and intention to buy (Sia 2009).

Online users' trust and satisfaction have been identified as the important factors to influence the intentions to buy and E-loyalty (Mithas 2006; Cyr 2008). Website usability and quality are directly related with online users' satisfaction and trust. Therefore, current research focuses on two main streams: online users' trust and satisfaction which are two keystones in website design research.

This paper selects 21 literatures from top journals in IS filed and these papers are reviewed based on online users' trust and satisfaction. Then the characteristics of websites drawing from the literatures have been explained based on trust building process theory (Gefen 2003), TAM model and convenience theory (Sucheta 2007), in turn relate trust and satisfaction with intention to purchase online. The new model presented in the paper provides us a comprehensive model to better understand why and how the website characteristics influence online users' perceptions and ultimately determine their intentions.

Literature Selection

We search four top journals: MISQ (MIS Quarterly), JMIS (Journal of management information system), ISR (Information system research), JCIS (Journal of computer information system). We choose them because they are top journals in IS fields and publications in these journals reflect the trend of web design research.

As we have mentioned above, online users' trust and satisfaction have been identified as two main research streams. Website usability and quality can be viewed as main reasons to user's satisfaction. In turn, online users' satisfaction and trust will directly influent online purchase intention and E-loyalty. Previous research also confirmed that website usability and quality also influence online users' trust (Gefen 2003). We categorize website usability and website quality to satisfaction stream because trust is especially associated with social risk and uncertainty, however, satisfaction is more concerned with technology itself. Given that a web site is both a product of information technology and the channel through which consumers interact with an E-vendor, technology-based attitude (satisfaction) and social-based attitude (trust) should work together to influent the online users' purchase intentions and E-loyalty. Based on the two broad classifications, the body of web design research can be figured out.

We further split trust stream into initial trust and general trust. Initial trust is characterized by a lack of experience with or firsthand knowledge of other party (McKnight 1998). Some special antecedents have been identified to establish initial trust with e-commerce setting and thus we separate it from long-term trust research. Therefore, we organize our literatures with the Table 1, several topics may overlap in some papers, and the collected papers are mapped into the categories based on the main topics they discuss.

Next, the subsections in the table as a device to structure a discussion of major results and implications arising from the studies in web design field.

Trust and Web Design

Recognizing that a vital key to retain online customers is maintaining their trust in the e-vendor (Reichheld and Schefter 2000) and that trust is at the heart of relationships of all kinds transactions, many studies (Wing S 2006; McKnight 1998; Robin 2003; Gefen 2003; Wakefied 2004) examine trust as a primary reason for why customers have the intentions to purchase on line. (See Table 1)

General Trust

David Gefen (2003) combined TAM model and trust building process theory to explain the online purchase intentions. Web site was viewed as an information technology in the research, and thus perceived ease of use (PEU) and perceived usefulness (PU) were directly related with online users'

intentions based on TAM model. Trust was a critical aspect of e-commerce. Drawing from a bunch of previous conceptualizations of trust, the research defined trust as a set of beliefs including integrity, benevolence, ability and predictability, which together comprised the most widely used specific beliefs in the literature. Five antecedents of trust borrowed from trust building theory had been discussed based on the definition of trust.

Personality-based trust referred to personal tendency to believe or not to believe in others and so trust them. Cognitive-based trust built on the first impressions or observations of individuals. The two antecedents focused on established initial trust.

However, the paper focused on the trust which consumers already had the first-hand experience with the online e-vendor. Therefore, other three antecedents had been well described and included in the research model.

Familiarity with the E-vender was identified as knowledge-based trust antecedents which reduced the possibility that the customers may mistakenly sense that he or she was being taken unfair advantage of when they were familiar with the online purchase environment and technologies.

According to calculative-based trust, if the costs of being caught outweighed the benefits of cheating, then trust was warranted since cheating was not in the best interest of the other party.

Two types of institution-based trust were defined namely situation normality and structural assurances. Situational normality was an assessment that the transaction would be a success, based on how normal or customary the situation appeared to be. Structural assurances of structural safeguards referred to an assessment of success due to safety nets such as legal recourse, guarantees, and regulations that existed in a specific context.

Trust building theory identified calculative, institution and knowledge based antecedents as the precursors to establish the long-term trust. The paper also argued that the three precursors relate with perceived ease of use and ultimately have influence on intention to use based on previous research.

A structured equation model (SEM) was hired to validate the research model, only the path between familiarity and trust was not significant. Therefore, we can establish the online trust pre-requirements: 1)a belief that the vendor has nothing to gain by cheating 2) the belief that there are safety mechanisms built into the web site3) have a typical and ease to use interface.

Pennington (2004) argued that the perceived trust in e-vendor was influenced by system trust which determined by seals, guarantees and ratings and perceived vendor reputation. System trust can be categorized in institution-based antecedents and perceived vendor reputation can be classified as cognitive-based trust which mainly determined the initial trust. Actually, initial trust and long-term trust shared some properties but had different salient predictors and thus we will separate initial trust from long- term trust.

Recently, more research focused on exploiting the specific precursor to trust such as trust-assuring argument. Dongmin Kim (2006) identified three elements of trust arguments including claim, data and backing based on Toulmin's model(1956). By combining these three elements, three forms of trust-assuring arguments (claim only, claim plus data, and claim plus data and backing) were developed. The effects of these three forms of trust-assuring arguments on consumer trust in an Internet store were tested by comparing them to a no trust-assuring argument condition in a laboratory experiment with 112 participants.

The results indicate that (1) providing trust-assuring arguments that consist of claim plus data or claim plus data and backing increases institution-based trust but displaying arguments that contain claim only does not and (2) trust-assuring arguments that include claim plus data and backing lead to the highest level of institution-based trust among the three forms of arguments examined in this study.

Initial trust

There are many other variables that can have influence on trust, especially initial trust. Among them are risk, vendor size, and reputation and trust transference. However, after the first-hand experience, people are more influenced by the natural of the interaction itself.

A study (Wing S 2006) examined the online trust with the comparison between before and after first-hand experience was gained by online users. The results indicated that perceived E-vendor's integrity significantly influenced online users' initial trust while both the perceived integrity and perceived ability of E-vendor significantly impacted the trust after first-hand experience.

Wakefield (2004) extended initial Trust Building Model (TBM, McKnight, 2002) by adding web seal value in the antecedents of initial trust in web site. Perceived site quality (communication, opportunism, brand equity and attractiveness) which were associated with cognitive-based trust directly influenced initial trust. However, web seal value which based on institution antecedents was less important in the formation of initial trust and purchase intentions.

Initial trust and long-term trust are overlapped, however, as we have reviewed, initial trust focuses on cognitive-based antecedents while structured-based antecedents are more important predictors of online users' behaviors with first-hand experience gaining.

Satisfaction and Web Design

Research on website design can be classified into two different research streams: identifying the attributes that contribute to website usability, and quantifying the effect of website quality on consumer perceptions and intentions. Now, we will discuss them respectively.

Website Usability and Website Design

Usability has been conceptually defined and operationally measured in multiple ways. Most researchers adopt the ISO definition of usability-"the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use".

With the definition, Agarwal and Venkatesh (2002) utilized categories and sub categories comprising the Microsoft Usability Guidelines (MUG) to develop an instrument that operationalized web site usability. In another study, Ventatesh and Ramesh (2006) utilized this instrument within a different environment (Finland) and context (web and wireless) to test its robustness and generalizability. They suggested that the instrument outperformed the widely employed technology acceptance model (TAM) in terms of richness and variance explained. McCloskey (2003) applied TAM to electronic commerce participation using a sample of 138 college students. The results showed that the number of hours spent on using the Internet per week had a significant impact on all four measures of electronic commerce participation, including whether they bought something online, how many times they bought something online, how frequently and how much was spent buying online. Obviously, the more hours spent on using Internet, the online users are more familiar with e-commerce environment. Based on the study of Nadharni and Gupta (2007), user familiarity will moderate the relationship between objective website complexity and perceived website complexity. And there is a negative relationship between perceived website complexity and user satisfaction for goal-directed users (have a clearly definable goal hierarchy, putting more effort into reaching the end goal rather than into undirected exploration). These studies provide us sufficient evidence to argue that the research on website characteristics and their influence should not be isolated from the properties of online users.

Expected website characteristics have been described in Argarwal& Venkatesh's (2002) instrument is: 1) Ease of use represents the cognitive effort required in using a web site. 2) Made-for-the-medium relates to tailoring a web site to fit a particular user's needs. 3) Emotion taps into affective reactions invoked by a web site. 4) Content assesses the informational and transactional capabilities of a web site. 5) Promotion is defined as the extent to which the web site is promoted on the web and other media.

Palmer (2002) also developed a measurement of web site usability. Five elements were included in the Palmer's instrument. 1) Download delay was the initial request for access to the page and then each subsequent request for changing pages with the site. 2) Navigability 3) Content included the amount and variety of content as well as the use of text, graphics, and multimedia. 4) Interactivity included the ability to customize the site's look, feel and content as well as provided interaction with the user. 5) Responsiveness was defined as the presence of feedback to users and the availability of response from the site mangers.

Green and Pearson (2009) examined the validity of the two instruments (Palm vs. Agarwal &Venkatesh) in the B2C e-commerce environment. The results of confirmatory factor analysis showed that Palm instrument displayed moderately acceptable measurement properties while Agarwal & Venkatesh instrument exhibited poor validity for the suggested dimensions. Neither of them achieved adequate validation and specification of dimensions when examined in an e-commerce setting.

Cappel and Huang (2007) presented a guidelines including "do's" and "don'ts", 11 basic guidelines categorized in avoidance of web design errors, use of web conventions and inclusion of features to promote usability had been described to be related with website usability.

Scheffelmaier and Vinsonhaler (2002) synthesized 59 studies of properties characterizing successful Internet commerce web sites. 68 properties had been listed and categorized into 12 groups and the most frequently mentioned property groups included: easy to understand and use, good values of the traditional store, customer services beyond expectations, efficient and fast, an effective home page, products quickly and easily found, a common design which is applied to all pages, and buying products is fast and easy. In this study, researchers identified two theories to explain online users' purchase behaviors: traditional marketing theory and convenience theory. According to traditional marketing theory, sites that attract and keep the users for the longer period of time, for whatever reason, should sell more. Based on convenience theory, sites that make it easy to find and buy products, and keep the user for a minimum time, should sell more. The contradiction between the underlying paradigms makes the issue "how to design effective website that attract more online users buying" bleak. Actually, different theory should be applied to different online context to maximize the website usability.

Nadkarni and Gupta (2007) argued that there was a negative relationship between perceived website complexity and user satisfaction for goal-directed users while an inversed-U relationship existed between perceived website complexity and user satisfaction for experiential users. Goal-direct users had specific end goal and did not want to expend unnecessary effort in processing challenging information while experimental users focused on the process of exploration and put greater effort into processing challenge. Therefore, convenience theory is appropriate to apply to explain the purchase intentions for goal-direct users. On the other hand, traditional marketing theory can be used to explain the purchase intentions for experiential users.

In the study of Hong, Thong, and Tam (2004), the researchers examined the effects of flash animation on online users' recall behavior and found that flash did attract users' attention but there was no evidence that attracting attention increased recall of the flashed item and may even decrease the overall recall. These findings were consistent with McKinney & Yook & Fatemeh's (2002) study that consumer disconfirmation which had been defined as consumer subjective judgments resulting from comparing their expectations and their perceptions of performance received was directly related with the online users' satisfaction. Thus, online users' task and their expectation will moderate the relationship between website characteristics and their influence.

With our literature review, we have found that many instruments had been developed to measure the website usability; however, empirical researches to validate them are not consistent. The main reason may be that the underlying theories of various instruments have not been identified and the characteristics of websites and their influence vary significantly according to online users' goals and experience. However, three perspectives including Trust building theory, convenience theory and TAM model combined together can explain most current research findings. Next, we will review more literatures according to them.

Website Quality and their influence

Everard and Galletta (2006) presented model that hypothesized errors, poor style, and online store had an influence on perceived website quality. Further, this perceived quality of the online stores' Web site would be directly related to users' trust in the store and, ultimately, to users' intentions to purchase from the store. The flaws presented on the website made online users observe abnormality and lowered their trust to the e-vendor. 2*2*2 ANOVA was hired to validate the research model and mediation test suggested that it was not the presence of a flaw but, rather, the perception of the flaw that effected users' perception of the site's quality. The results were coherent with trust building theory, perceived website quality could be classified as institution-based abnormality.

Tarafdar and Zhang (2005)combined Palmer (2002) and McKinney's work (2002) and listed the characteristics leading to website success which evaluated by IS expert in this study. With a comparison across different industries including (Retail, Finance services, News& information, Search & Portal and Entertainment) , they concluded that1) for retailing websites, the most important characteristic was security 2) for Financial Services websites, security and customization were the two most important characteristics 3) for information related websites such as News & Information website, Search Engines & Portals, information quality, usability, ease of navigation and speed were the most important characteristics. 4) Usability which included "interesting" and "exciting" was most important for Entertainment website.

According TAM model and trust building theory1) for retailing websites, online users' trust was first important and thus website characteristics associated

with security were important 2) for Financial services websites, both trust and usefulness (customization) were important, and website designers should focused on both 3) for information related websites, two elements of TAM (usefulness, ease of use) should be most important predictors of intention use. 4) Engagement including interesting and exciting was most important for entertainment web and it was another important predictors for online users' intention but do not include in TAM model. As we have mentioned, Venkatesh and Ramesh (2006) compared general technology acceptance model (TAM) that a model based on general cognitive beliefs about technology with Microsoft Usage Guiderliens (MUG) that a model based on perceptions of design attributes and found that the latter explained more richness and variance. These studies provide evidence to argue that TAM model should be adjusted to E-commerce setting.

Webster and Ahuja (2006) presented an advanced global navigation system and an experiment was conducted to examine the effectiveness of such navigation system. The results showed that the system resulted in lower disorientation than the simple system. Based on this study, well designed navigation system lowered the perceived disorientation and increased online users' engagement. In this study, engagement had been characterized as flow without user control, or perceptions of attention focus, curiosity, and intrinsic interest (Chapman, 1999). Engagement captured the online users' predisposition, therefore, the study provide us more evidence to involve in engagement to online users' intention explanation model.

Udo and Marquis (2002) examined 8 factors related to website effectiveness and found that 4 factors including download time, navigation, graphics usage, and interactivity had significant positive impact on web site effectiveness. Website effectiveness had been defined as how impressed the users were with the web sites visited and consequently how willing they would be to revisit a site.

According to Schneider and Perry (2000), the objectives of an effective web site included:

1. Attracting visitors to the web site (engagement)
2. Making the site interesting enough that visitors stay and explore(engagement)
3. Convincing visitors to follow the site's links to obtain information(usefulness)
4. Creating an impression consistent with the organization's desired image(cognitive-based trust)
5. Reinforcing positive images that the visitors might already have about the organization (knowledge-based trust: familiarity).

The concept of website effectiveness is comprised by engagement, usefulness and partial trust. We replace perceived usefulness (PU) in TAM model by website effectiveness. TAM model is a general model in IS field, such substitution make the model reflect more properties relate to website design-the special IS technology.

Jiang and Benbasat (2005) discussed the virtual product experience and their effects on perceived diagnosticity (the extent to which a consumer believes the shopping experience is helpful to evaluate a product; perceived usefulness) and flow (users' affective response to computer usage, characterizing playfulness and exploration as defining characteristics of human-computer interactions; engagement). The results showed that virtual control including visual control and functional control increased consumer overall perceived diagnosticity and flow. A high correlation between perceived diagosticity and flow was found in the study suggested that, in the context of VPE, customers' decision-making was not distinct from their shopping experience; rather, these both were integral to online shopping. We can use website effectiveness which had been defined above to integrate the two concepts: perceived diagnosticity (PU) and flow (Engagement).

Gregg and Walczak (2008) examined whether creating a more professional online e-image can signal consumers about unobservable product or company quality, and whether this signal influenced their willingness to transact with the company, and ultimately the prices they were willing to pay for the company's goods and services. A professional e-image was given by selecting a professional sounding user identity(cognitive-trust) and maintaining a high quality website that provided clear return and shipping policies (Institution-based trust)and a professional looking listing style (Website effectiveness). An experiment was conducted on e-bay and findings suggested that increasing the quality of an auction business's e-image did increase consumers' willingness to transact with the business, and increased prices received at auction. Previous research focused on online user's purchase intentions, the contribution of this study was that it related the

website characteristics to the online user's purchase behavior not only intentions.

Characteristics of Websites and Their Influence on Online Users' Purchase Intentions

As we have reviewed, website characteristics and their influence vary significantly with different culture (Cyr, 2008; Sia etc, 2009), business domain (Ramasubbu, 2006), sex (Zahedi,Vanpelt & Srite, 2006), goals and the degree of users' familiarity to technology (Nadkarni & Gupta, 2007; Kamis etc, 2008).

We are going to generalize a model which focuses on goal-directed consumers who have prior experience with a particular e-vendor and clear on their online goals and tasks. Given this scenario, we will explore mechanism between website characteristics and their online purchase intentions based on trust building theory, convenient theory and adjusted TAM model.

Gefen (2003) developed an integrated model which combined trust and TAM, however, as we have discussed above, TAM is a general model and we need adjust it to online shopping environment. According to TAM, perceived ease of use and usefulness will impact users' attitude. In E-commerce environment, the online users' satisfaction represents a positive attitude to website and thus we parallel satisfaction with trust. Trust and satisfaction has been found as the most important two factors to influence online users' purchase intentions (Mihas 2006; Cyr 2008). It is noted that the trust in our model is different from initial trust because we suppose that the online users have prior experience with the E-vendors. Therefore, many other variables including culture, vendor size and reputation, risk are not included in the model.

H1: Online users' trust will result in their purchase intentions.

H2: Online users' satisfaction will result in their purchase intentions.

According to trust building theory, institution- based structure antecedents have been identified as the most important factors that influence online users' trust (Gefen 2003) and the institution-based structure includes seals, rating and guarantees (Robin 2003). Institution-based abnormality is another important factor to impact online users' trust such as perceived flaws including poor style, incompleteness and errors will negatively relate with trust and perceived website quality (Andrea 2005). In turn, perceived website quality will impact online users' satisfaction (McKinney 2002).

H3: Institution-based structural assurance including seals, rating and guarantees will positively relate with online users' trust.

H4a: Institution-based situational abnormality including poor style, incompleteness and error will negatively relate with online users' trust.

H4b: Institution-based situational abnormality including poor style, incompleteness and error will negatively relate with online users' satisfaction.

Argarwal & Venkatesh's instrument focuses on online users' social presence (Made-for-the - Medium) and engagement (Emotion) and thus attempt to attract online users visit the sites for longer time to make them purchase online. However, Palmers' instrument focuses on quick response (download delay, responsiveness, interactivity) and convenience to use (navigation). Therefore, Argarwal& Venkatesh's instrument is consistent with traditional marketing theory while Palmers' instrument holds on convenience theory. In our study, online users are assumed with clear goals and consider challenge as a deterrent to their main effort. Thus, we adopt Palmers' instrument to further explore our model.

According to trust building theory, customization and interactivity are two constructs that make online users' better understand their status and "what is going on" with the website thus should be ascribed to knowledge-based familiarity antecedents. Insufficient statistical evidence showed knowledge-based familiarity related with trust (Gefen 2003). However, previous research showed enough evidence that they will improve online users' satisfaction (McKinney).

H5: Knowledge-based familiarity including customization and interactivity will positively relate with online users' satisfaction.

Download delay, navigation, information and responsiveness should be classified as website effectiveness according to the definition of Schneider and Perry (Schneider 2000). As we have mentioned, we will use effectiveness to replace usefulness in TAM model.

H6: Website effectiveness including download delay, navigation, content and responsiveness will positively relate with online users' satisfaction.

Finally, website should be perceived ease of use. It positively relate with website effectiveness, trust and satisfaction (Gefen 2003; McKinney 2002). We do not include more advanced technology such as virtual product experience (Zhenhui 2006) (VPE) and attribute-based decision support system (Kamis 2006) (ABDSS) because we assume that the online users are goal-directed consumers.

H7a: Perceived ease of use will positively relate with online users' satisfaction.

H7b: Perceived ease of use will positively relate with online users' trust.

H7c: Perceived ease of use will positively relate with website effectiveness.

The model is depicted in Fig 1.

Discussions

Green and Pearson (2009) used a B2C e-commerce simulation in an effort to validate two web site usability instruments: Palmer (2002) vs. Agarwal and Venkatesh (2002). The results showed that although they displayed moderate nomological validity, neither of them achieved adequate validation and specification of dimensions when examined in an e-commerce setting. Actually many studies attempted to develop standardized instruments that are both valid and reliable that direct comparisons between individuals, time periods, organizations, industries, and cultures can be made. However, this type of research typically has not been completed even on the most frequently utilized instruments. Part of the reason is that these studies are not directed by theories but by empirical findings.

By adopting trust building process theory, adjusted TAM model and convenience theory, we established a comprehensive model to explain the mechanism between website characteristics and their influence in specific online surroundings. Though two basic factors including product and price are most important for online users' purchase, website characteristics operate differently on intentions to buy. The proposed model explains the related website characteristics and their influence on online users' cognition, familiarity, and perceptions of abnormality, effectiveness and efficiency. In turn, these online users' subjective feelings will impact their attitudes including trust and satisfaction to web and thus determine their intentions to purchase. Extended work can develop instruments to validate the model with empirical research

References

Andrea E, "How Presentation Flaws Affect Perceived Site Quality, Trust, and Intention to Purchase from an Online Store," Journal of Management Information System (22:3), Winter 2005(6). pp. 55-95.

Arnold Kamis, "Using an Attribute-based Decision Support System for User-customized Products Online: an experimental investigation," MIS Quarterly (32:1), March 2008, pp. 159-217

Agarwal Ritu, Viswanath Venkatesh, "Assessing a Firm's Web Presence: A Heuristic Evaluation Procedure for the Measurement of Usability," Information Systems Research (13:2), June 2002, pp. 168-186.

C. Ranganathan, "An Exploratory Examination of Factors Affecting Online Sales," Journal of Computer Information Systems, Spring 2002, pp. 87-93.

Choon Ling Sia, "Web Strategies to Promote Internet Shopping: is Cultural-customization Needed?" MIS Quarterly (33:3), September 2009, pp. 491-512

David Gefen, "Trust and TAM in Online Shopping: an Integrated Model," MIS Quarterly (27:1), March 2003, pp. 51-90.

David T. Green, "The Examination of Two Web Site Usability Instruments for Use in B2C E-commerce Organizations," Journal of Computer Information Systems, Summer 2009, pp. 19-32.

Dawn G. Gregg, " Dressing Your Online Auction Business for Success: An Experiment comparing two e-bay businesses," MIS Quarterly (32:3), September 2008, pp. 653-670.

Dianne Cyr, " Exploring Human Images in Website Design: A Multi-method Approach," MIS Quarterly (33:3), September 2009, pp. 539-566.

Dianne Cyr, "Modeling Web Site Design across Cultures: Relationships to Trust, Satisfaction, and E-Loyalty," Journal of Management Information Systems (24:4), Spring 2008, pp. 47–72.

Dongmin Kim Izak Benbasat "The Effects of Trust-Assuring Arguments on Consumer Trust in Internet Stores: Application of Toulmin's Model of Argumentation", Information Systems Research (17:3), September 2006, pp. 286–3011.

Donna McCloskey, "Evaluating Electronic Commerce Acceptance with the Technology Acceptance Model," Journal of Computer Information Systems, Winter 2003-2004, pp. 49-57.

Gerry W.S ,John F.V, "A Synthesis of Research on the Properties of Effective Internet Commerce Web Sites", Journal of Computer Information Systems, Winter 2002-2003, pp. 23-30.

Godwin J.Udo, "Factors Affecting E-commerce Website Effectiveness," Journal of Computer Information Systems, Winter 2001-2002, pp. 10-16.

James J.C, Zhenyu Huang, "A Usability Analysis of Company Websites", Journal of Computer Information Systems, Fall, 2007, pp. 117-123.

Jane Webster, " Enhancing the Design of Web Navigation Systems: the Influence of User Disorientation on Engagement and Performance," MIS Quarterly (30:3), September 2006, pp. 661-678.

Jean A. Pratt, "The Effects of Navigational Orientation and User Experience on User Task Efficiency and Frustration Levels," Journal of Computer Information Systems, Summer 2004, pp. 93-100.

Jonathan W. Palmer, "Web Site Usability, Design, and Performance Metrics" Information Systems Research (13:2), June 2002, pp. 151-167.

"Mariam" F, "Web Documents' Cultural Masculinity and Femininity," Journal of Management Information Systems (21:3), June 2003, pp. 87-128.

McKnight, D.H., Cummings, L.L, Chervancy N.L. "Initial Trust Formation in New Organizational Relationships", Academy of Management Review (23:3), 1998, pp472-490.

Monideepa Tarafdar, Jie Zhang," Analysis of Critical Website Characteristics: A Cross-category Study of Successful Websites", Journal of Computer Information Systems, Winter 2005-2006, pp. 14-24.
Robin P, "The Role of System Trust in Business-to-Consumer Transactions," Journal of Management Information Systems (20:3), Winter 2003, pp. 197-226.

Schneider, G.P., Penny J.T, Electronic Commerce. Cambridge, MA: Course. Technology 2000.

Sucheta Nadkarni, Reetika Gupta, "A task-based model of perceived website complexity," MIS Quarterly (31:3), September 2007, pp. 501-524.

Sunil Mithas, "Designing Web Sites for Customer Loyalty across Business Domains: A Multilevel Analysis," Journal of Management Information Systems (23:3), Winter 2006–7, pp. 97–127.

Vicki McKinney, "The Measurement of Web-Customer Satisfaction: An Expectation and Disconfirmation Approach," Information Systems Research, 2002 (13:3), September 2002, pp. 296-315.

Viswanath Venkatesh, "Web and Wireless Site Usability: Understanding Differences and Modeling use," MIS Quarterly (30:1), March 2006, pp. 181-206.

Wakefield R. L, "The Role of Web Site Characteristics in Initial Trust Formation," Journal of Computer Information Systems, Fall 2004, pp. 94-103.

Weiyin Hong, "Does Animation Attract Online Users' Attention? The Effects of Flash on Information Search Performance and Perceptions", Information Systems Research (15:1), 2004, pp. 60–86.

Wing S. C, Angie N. K. O., "A Study of Trust in E-shopping Before and After First-hand Experience is Gained", Journal of Computer Information Systems, Summer, 2006, pp. 125-130.

Yeung W. L, "Gaining Competitive Advantages through a Functionality Grid for Website Evaluation," Journal of Computer Information Systems, Summer 2004, pp. 67-77.

Zhenhui Jiang, "Virtual Product Experience: Effects of Visual and Functional Control of Products on Perceived Diagnosticity and Flow in Electronic Shopping" Journal of Management Information Systems (21:3), March 2006, pp. 111-147.

Table 1 Selected article distribution

Stream	Online Trust		Satisfaction	
Subsection	**Initial Trust**	**General Trust**	**Usability**	**Quality**
MISQ		(Gefen 2003)	(Venkatesh 2006; Sucheta 2007)	(Webster 2006; Gregg 2008)
JMIS	(Wakefied 2004)	(Robin 2003)	(Mccloskey 2003)	(Andrea 2005; Gerry 2002; Yeung 2004)
JCIS	(Wing S 2006)		(David 2009; James 2007; Gerry 2002)	(Tarafdar 2005; C.Ranganathan 2002;Udo 2001)
ISR		(Mcknight 1998)	(Agarwal 2002; Palmer 2002)	

Figure 1. Website Characteristics and Their Influence on Online Users' Purchase Intentions