With the Power of Light, You Can Create Color

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Acknowledgements

About the Journal

The *Visual Communications Journal* serves as the official journal of the International Graphic Arts Education Association, Inc., and provides a professional communicative link for educators and industry personnel associated with design, presentation, management, and reproduction of graphic forms of communication. Manuscripts submitted for publication are subject to peer review by the Association and the views and opinions expressed herein are those of authors and do not necessarily reflect the policy or the views of the IGAEA.

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Editor's Note

by Jerry J. Waite, Ed.D, University of Houston

As always, this issue of the *Visual Communications Journal* has something for everyone involved in graphic arts and graphic arts education.

Art Seto, from Ryerson University in Canada, reports on a process he used to implement an enterprise resource planning (ERP) system in his Graphic Communication Management program. In addition to describing how the system was installed and used by students, Art also details the results of a post-course survey of participating students in which several technical difficulties came to light. This is a very worthwhile read for those interested in adding ERP software to their curricula.
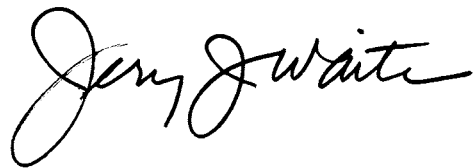
Dr. Dan Wilson and his colleagues Dr. Kevin Devine and Dr. Richard Boser, from Illinois State University, provide colleges and universities with an easy-to-use and very effective method to implement Outcomes Assessment in Graphic Communications. This article is particularly important for college or university faculty who intend to seek accreditation from the Accreditation Council for Collegiate Graphic Communications (ACCGC). Dan's work in assessment was recently written into the ACCGC Accreditation Handbook and we, at University of Houston, acted as the beta site when we prepared our accreditation self-study report. Dan's method for assessment works well and is practical!

Teaching graphic communications courses online continues to be an important topic to the *Visual Communications Journal* authors. In this issue, Dr. Bob Chung, from Rochester Institute of Technology, recounts his nearly decade-long odyssey in delivering high-level instruction via the World Wide Web. This article, which grew out of Bob's very effective presentation at the 2008 IGAEA conference, is an important read for anybody interested in providing graphic communications coursework in either on-line or hybrid (part on-line and part face-to-face) modes. Dr. LaVerne Abe Harris, from Purdue University, and Dr. Carl Blue, from University of Northern Iowa, are also long-time advocates of on-line education. In this issue of the *Journal,* LaVerne and Carl describe several technologies used to provide on-line experiences and report on their students' experiences using those technologies.

Ken Macro, from California Polytechnic State University San Luis Obispo, traces the transformation of printers from "scholars" to "blue-collar-workers" in his sociological look at printing history from Gutenberg to the present. Ken suggests that "an educated, literate, and industrial society is the direct result of printing technology. However, as this technology progressed in an age of industrialism, the highly-skilled workforce employed within it became obsolete as automated technology innovation—coupled with a distinct drive to increase production efficacy and profits—became more prevalent." Ken believes that we must make a concerted effort to re-establish the historical role of printer as scholar: "Gone are the days of the printer in the aristocracy, but advancements of the knowledge worker/printer are only a classroom away." These are thought-provoking words.

Finally, Richard Dooley, from Kean University, reports on his study of printers who have established presence in China. He found that printers who successfully establish plants in China: have the right local partner to help navigate the intricate network of business regulations and to negotiate with Chinese government officials; are aware of and sensitive to cultural differences and working with on-site professionals to address those issues; hire a substantial percentage of Chinese workers to take advantage of lower labor costs; and take steps to overcome difficulties associated with the language barrier.

Thank you to the *Journal's* Editorial Review Board. I truly appreciate the time and effort invested by Cynthia Carlton-Thompson, James Tenorio, Zeke Prust, Bob Chung, Malcolm Keif, Chris Lantz, and Mark Snyder.
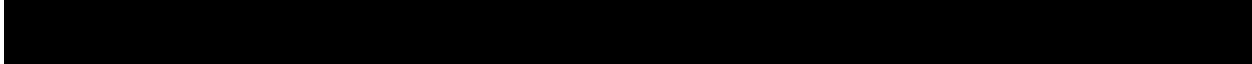
Implementing and Teaching Management Information Systems (MIS) in the Undergraduate Print School Curriculum: A Need and a Challenge

by Mr. Art Seto, School of Graphic Communications Management, Ryerson University

Introduction

A significant amount of research has been done on the challenges, successes, failures, and best practices of implementing ERP (Enterprise Resource Planning) systems in medium to large size companies and in a diverse range of business sectors and manufacturing industries. Relatively little research has been done on the implementation and use of enterprise systems in the printing industry.

Published research results on the implementation and teaching of larger ERP systems in business schools are available, but similar results applied to print schools are uncommon. Teaching of MIS in print schools is not commonplace as print schools recognize the significant challenges that exist in implementing and teaching enterprise systems in the school program (Wagner, 2007).

This paper reports on the results of a pilot implementation and teaching of MIS in a Graphic Communications Management (GCM) program.

Enterprise Information Systems

Seventy percent of Fortune 1000 companies have implemented ERP systems (Peslak, 2005), which tend to be for larger enterprises. Post Y2K, ERP vendors have been successful at implementing stripped-down systems at medium-size enterprises as well as selling add-on modules such as Human Resource Management Systems (HRMS), Customer Relationship Management systems (CRM), Decision Support Systems (DSS) or other systems. Second-tier (Romeo, 2001) Enterprise Systems, which include Print MIS systems, are targeted specifically to a particular industry.

The Need for Implementation

Many companies have disparate information systems which may be in the form of a manual paper-based estimating or docket system, a stand-alone computerized accounting system, a custom-written data collection or other system. Enterprise systems allow for cost effective sharing of data and resolve the problem of data redundancy, the costs related to duplication of data entry, the opportunity for errors to occur and the costs of supporting fragmented "islands of information" (Muscatello et al., 2003).

Enterprise systems tie together once disparate applications into connected modules that share common database tables and allow companies to leverage the power of relational databases to collect, store, organize, share, and continually use and reuse important data collected by a company during the day-to-day operations of the business. Without enterprise systems, different systems are unable to communicate without special software middleware programs called APIs (Application Protocol Interfaces).

Print MIS Systems

An Electronic Document Systems Foundation (EDSF) sponsored research study done through Pittsburg State University (Rodriguez et el., 2006) confirms the benefits of MIS/ERP systems as being:

- access to real-time data;

- ability to establish and track production metrics; and

- capability to make better business decisions.

The Phillip Ruggles (1996) list of MIS vendors shows approximately one hundred Print MIS systems. Although there have been consolidations and acquisitions since the publication of the Ruggles list, there have been a significant number of new vendors launched in the past decade. Print MIS systems are programmed significantly differently from each other in terms of functionality, database structure and GUI (graphical user interfaces).

The large number of choices makes it more difficult to choose a Print MIS system than to choose other software used in the printing industry. For example, when choos-

ing page layout, (photo retouching, workflow software applications, etc.) there are only a few vendors to choose from: Quark, Adobe, Corel, and Microsoft.

The cost of Print MIS systems can range from a few thousand dollars to a few hundred thousand dollars and even to a few million dollars depending on the number of modules implemented and the number of concurrent users. These systems are technically complex and the time and cost to implement a system are considerable when compared to other printing software. If an incorrect choice is made, the investment—including software, hardware, implementation, and training—may be lost. A wrong choice of systems can also impact morale and can affect customer service.

The Need for MIS Education in the Print School

There are additional compelling reasons for the teaching of MIS systems in the print school curriculum. As MIS systems are adopted by printers, the demand for greater information-systems literacy also increases in the printing industry. An EDSF study shows that 83.9% of the respondents are using MIS/ERP within their print production area (Rodriquez et al., 2006). Graduates from printing schools will be required to implement, use, upgrade, and manage these systems.

There are serious consequences of "not improving workflow efficiencies in a competitive marketplace" (Kular, 2007). One of the solutions to addressing these challenges includes computer integrated manufacturing (CIM) initiatives. Seventy-five percent of printers are looking for "streamlined information between systems/applications" (Harvey, 2007). Job Definition Format (JDF) implementation, which uses a Print MIS system as the front-end (D'Amico, 2006), may be the key.

There are unique challenges to implementing an MIS system for the purpose of educating students. Since few print schools have implemented Print MIS systems (Wagner, 2007), Print MIS vendors have little direct experience. Because of the time required to implement, learn, design relevant lessons and assignments, and-maintain and upgrade the system, getting instructors onboard can be a challenge. To offset the significant time commitment required to implement teaching enterprise

systems at one business school, the dean provided monetary incentives (Cannon et al., 2004).

Challenges of Implementing Enterprise Systems

Implementing and using the enterprise systems can contribute significantly to a company's sustainability. However, the implementation of an enterprise system can be a daunting task. On a larger ERP system implementation, such as SAP, there could be as many as 8,000 switches to set. A switch could be as simple as to calculate in standard or metric or as customer-defined as to ship to the head office shipping dock or to the receptionist. Activities relating to planning, consulting, installing, and training of these systems often cost more than the software themselves (Muscatello et al., 2003). There is much literature relating to ERP project management failures and best implementation practices.

A significant amount of time must be allocated to the preparation and loading of data into the new system. Without data integrity, the benefits of an enterprise system may be lost. Data in the relational databases shipped with MIS software generally does not reflect the equipment, processes, and policies used by the purchaser.

The 2006 EDSF research study found that data input errors during implementation were "huge," with those attributed to the user data interface accounting for 70% of errors and equipment failure accounting for 30% of errors.

Legacy data may have contextual problems due to the data coming from disparate systems, leading to unsatisfactory and confusing results. Data quality control should include reconciling data in the new system with the legacy data. Although it is the role of information technology (IT) personnel to provide the framework, rules, and processes to load data, it is important that data quality (DQ) be the responsibility of business people (Xu et al., 2002).

Some companies implementing new enterprise systems find this is the optimal time to reengineer processes. Printing companies may find this the time for a reconfiguration of GL (general ledger) codes so that accounting, reports, and financial ratios comparable to those produced by PIA/GATF can be used for benchmarking.

About the School of Graphic Communication Management

The School of Graphic Communication Management (GCM) in Toronto, Canada offers an applied business management degree with a particular focus in the print media industry.

Estimating is taught in thirty-nine hours, over thirteen-weeks, with part of the hours in lecture, and part in lab where active learning takes place. Students take estimating in the second semester of their third year so that they can leverage the fundamentals learned in prepress, press, bindery, and other subject areas. Since there is a significant amount of theoretical material to cover and practice to be done in this compressed course, students require a good grounding in imposition planning and paper math from previous courses in this four-year bachelor degree program. Two weeks of Estimating are dedicated to database computer (MIS) estimating, one week on demand estimating, and one week on litho estimating, as shown in Table 1 below.

Implementing the Pilot Print MIS System at GCM

Projects, including those of enterprise systems, usually involve cross-disciplinary project team members from different departments within the company. The GCM Enterprise System Implementation Team consisted of the Estimating course instructor and the IT Technician. The project was managed by the Estimating course instructor, who has over twenty years industry experience as an estimating manager and industry consultant. His experience includes implementing and using several Print MIS systems.

The benefit of the small project team meant that there were few interests to please, so an implementation without any customization was done. The downside to the small team was the limited time and resources available.

The major objectives for determining which Print MIS system to implement included being able to fast-track and streamline the implementation (especially data loading), so as to get up-and-running with limited time, effort, and ultimately low cost. A number of systems were considered. Avanti System's donated Print MIS system met the objectives. Table 2, on the following page, shows the decision-making considerations. Database licenses were provided by Pervasive.

Hardware and Software Implementation

A pilot project was implemented in the first year. An older model Dell server was redeployed and used as a combined application and database server, running the Windows 2000 IIS server operating system. Client terminals included 25 G5 Macs. Because of the different platforms used for the applications server (PC) and client workstations (MAC), Remote Desktop Connection

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Structure of Related Ryerson University - GCM Courses

GRA216 Manufacturing Management for the Graphic Arts*	GRA116 Estimating for the Graphic Arts*
Project Management	The Business of Estimating
Facilities Planning & Management	Print Specifications
Logistics & Warehouse Management	Budgeted Hourly Rates & Standards
Environmental Management	Impositions & Job Planning
Enterprise Systems	Estimating Paper
Environmental Management	Estimating Prepress
Decision Making	Estimating Sheetfed Press
Production Scheduling	Estimating Web Press
Production Planning	Estimating Bindery
Performance Measurement & Control	Bring It All Together
Imposition Planning I & II	Computer Estimating of Demand Printing
	Computer Estimating of Offset Printing
*Taught by the author of this paper	

Table 1

GCM's MIS Decision-making Considerations	
Streamlined application implementation	The server was delivered to the vendor. One week was allowed to a load, update, and configure the applications.
Streamlined fast-track data loading process	The instructor visited the vendor in person and together with a knowledgeable vendor technician (GCM grad) updated and loaded data relative to the student assignments.
Proximity to vendor	The location of the head office was deemed to be important due to the above two items, plus accessible walk-in service.
Service level	The vendor understood the lab/lecture and assignment schedule required reliable uptime and fast service response during the period when the MIS software application was being used by students.
Flexibility in designing estimating formulas	The method of creating estimating formulas "on-the-fly" is flexible and did not require a full setup of data lookup tables.
GCM graduates are employed by the vendor	GCM graduates work for the vendor, which gave a comfort level around their understanding of the requirements of a print school.
Size of vendor	The vendor was large enough to have the modules required. A medium size vendor was perceived to have flexibility, fast reaction, and more direct access to decisions.

Table 2

(RDC) software was installed and the Microsoft Terminal Services license was updated.

Since GCM is located in the five-year-old purpose-built Heidelberg Centre facilities, most of the infrastructure to operate the MIS system existed, including 100 base-T wiring, hubs, switches, routers, firewalls, UPS power supply, and RAID software backup system. Thus, significant infrastructure costs were avoided.

Microsoft Word was installed on the computers. In addition, a black and white laser printer enabled students to print detailed estimating and production reports and quotation letters.

Although all software modules were installed, only estimating was turned on in the pilot phase. This differs from an approach where all modules are implemented simultaneously. More time and resources are required to implement all modules simultaneously.

GCM runs its own IT infrastructure that is tied separately onto the university's IT backbone. With much of the workstations MAC based, in-house IT technical staff lacked the PC server and database skills required to support the system. So, it was important that the server box be serviceable on a walk-in basis by the MIS vendor.

Large Number of Users

There were 93 students registered in the full-time third-year of the day-school program, plus continuing education night-school students. This resulted in over 100 students potentially using the system concurrently. The day school program was divided into four lab sections of approximately 23 students each.

A medium-sized printing company with 100 employees may only have 10 to 20 concurrent users accessing the Print MIS system at any time. Costs increase proportionately for hard drive size, RAM, bandwidth, and database licenses required dependent on the number of concurrent users, or client access licenses (CALs) to be purchased. It was decided to secure only enough licenses equal to the number of workstations in the lab of 25 Macs. Students were given Internet access so they could access from campus wireless hotspots or from home.

Pedagogy

A dummy company was set up reflecting the prepress, press, and bindery equipment at the school. Some fictitious larger presses (web and flexo) were added. Complete detailed equipment specifications, standards, BHRs (budgeted hourly rates), policies, and procedures were part of the estimating manual that each student used in the first three quarters of the course, when students learned the fundamentals of manual estimating. Modules later in the

course on computer estimating were based on similar data lookup tables used earlier in the course. Students worked in groups of two and had weekly lab assignments.

GCM kept the system open regardless of risks. Security was minimized to allow students the ability to fully explore and test drive the system at the cost of potential changes being made and problems introduced. Students were trusted to preserve the integrity of the database tables.

Design and Data Collection

A paper-based survey questionnaire was designed to find out if the chosen approach to implementing teaching MIS would affect student (perception) of learning. The questionnaire was administered during the last lecture class. A five-point Likert Scale was used for most questions. Data was entered into Microsoft Excel and the Data Analysis feature was used to compute results and to determine the mean and standard deviation. The results are shown in Table 3.

Results and Discussion

Technical support was not provided after four p.m. or on the weekends. In the evening and on the mornings before an assignment was due, many of the 90 students attempted to access the system simultaneously. With only twenty-five concurrent licenses, some students were unable to connect. This may have led to dissatisfaction with the system in general. The repurposed server resources were limited. This had the effect of slowing down server access. This resulted in students facing problems with signing in and the system hanging up. Students were shown the correct PC logout procedures (versus shut down procedures). However, this was often not done properly. When students got frustrated, they may have improperly rebooted the system thinking the system had hung up. A regularly scheduled shut down of the system was done to log out those who did not log out properly.

GCM Winter 2007 Estimating student survey

Q	n=60	1	2	3	4	5	Mean	SD
1	I have used Avanti software prior to this course	Y=3.33%	N=96.67%				1.983	0.225
2	The time of day I accessed the Avanti system were	8am-noon =20%	noon-5pm =70%	5-10pm =6.67%	10pm-3am =3.33%	3-8am =0%	1.950	0.622
3	When I used Avanti from outside HEI302 lab, mostly it was from ….	HEI hallway =5%	Ryerson PC =8.33%	Home MAC =10%	Home PC =8.33%	Other or N/A =68.33%	4.267	1.233
4	I mostly accessed the following sources for Avanti estimating help	Instructor =33.33%	TA =10%	User manual =31.67%	Online help =6.67%	N/A =18.33%	2.667	1.469
5	I found the Avanti system fast	Strongly agree =0%	Agree =36.67%	Neutral =26.67%	Disagree =31.67%	Strongly disagree =5%	3.050	0.946
6	I had no technical problems	Strongly agree =1.67%	Agree =21.67%	Neutral =25%	Disagree =43.33%	Strongly disagree =8.33%	3.350	0.971
7	I found the system down the following number of times	1 =60%	2 =23.33%	3 =6.67%	4 =6.67%	4+ =3.33%	1.700	1.078
8	The Avanti estimating software was easy to use	Strongly agree =6.67%	Agree =36.67%	Neutral =33.33%	Disagree =18.33%	Strongly disagree =5%	2.783	0.993
9	Avanti estimating experience was useful / worth my time	Strongly agree =10%	Agree =35%	Neutral =30%	Disagree =8.335%	Strongly disagree =5%	2.500	0.966
10	I expect to use computer printing estimating during my career	Strongly agree =18.33%	Agree =35%	Neutral =28.33%	Disagree =8.33%	Strongly disagree =10%	2.567	1.184
11	After my experience in the course I could walk into a printshop and start using Avanti	Strongly agree =3.33%	Agree =33.33%	Neutral =32.76%	Disagree =23.33%	Strongly disagree =10%	3.033	1.057
12	I had enough knowledge in imposition planning, paper planning prior to using Avanti	Strongly agree =15.52%	Agree =34.48%	Neutral 32.76%	Disagree =15.52%	Strongly disagree =1.72%	2.534	0.995
13	If I can use computerized estimating well I do not need manual estimating	Strongly agree =13.79%	Agree =22.41%	Neutral =15.52%	Disagree =41.38%	Strongly disagree =6.9%	3.052	1.220
14	I would like to have had more lab time sessions using Avanti	Strongly agree =15.79%	Agree =31.58%	Neutral =26.32%	Disagree =17.54%	Strongly disagree =8.77%	2.719	1.192
15	I would like to have had more lab sessions using an additional computer assisted estimating system	Strongly agree =10.34%	Agree =27.59%	Neutral =46.55%	Disagree 12.07%	Strongly disagree 3.45%	2.707	0.937
16	The Avanti assignment(s) helped me learn how to use computerized printing estimating	Strongly agree =5.17%	Agree =67.24%	Neutral =20.69%	Disagree =5.17%	Strongly disagree =1.72%	2.310	0.730
17	The instructions I received were sufficient for me to complete my Avanti assignments	Strongly agree =3.39%	Agree =33.9%	Neutral =25.42%	Disagree =22.03%	Strongly disagree =15.42%	3.119	1.146
18	I would recommend implementing Avanti in a company that I work at in the future	Strongly agree =5.08%	Agree =33.9%	Neutral =42.37%	Disagree =11.86%	Strongly disagree =6.78%	2.814	0.955

Table 3

An equal number of students found the system fast versus slow while a large number reported they had technical problems and found the system down at least once. Most found the software easy to use. Only 13% of the students did not find the experience useful and only 18% believed they would not use a similar system during their careers. Because of the compressed nature of the course, it is not surprising that students said they could have used more time, more modules, and more teaching related to the software.

The survey results seem to confirm that most students (70%) worked on assignments during the few hours leading up to when they were due at 3 p.m.

Some students complained that other students accessed their estimates and copied their work, changed the estimate number, saved it, and submitted it as their own work. Since significant resources were required to audit the work of 93 students, it was decided to give students who completed the assignment an "effort mark" rather than a properly graded assignment mark.

Conclusion

This pilot study was deemed to be successful based on student comments on the questionnaire. As a result, new server hardware, software, and database software have been budgeted for the next school year. The MIS software use will be expanded to the Manufacturing Management course (see Table 1 above) including docket creation, scheduling, inventory control, and creation and analysis of management reports.

The current compressed nature of this estimating course allows only two weeks for computerized estimating. A second estimating course has been proposed as part of the school's curriculum review.

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A Pragmatic Method of Implementing Outcomes Assessment for Collegiate Graphic Communications Programs

by Dr. Daniel G. Wilson, Dr. Kevin L. Devine, Dr. Richard Boser, Illinois State University

Introduction

There is a growing trend toward an environment of accountability in higher education today. Early in 2006, US Secretary of Education Margaret Spellings issued "A Test of Leadership: Charting the Future of U.S. Higher Education." A major conclusion of the report is that there is a lack of accountability and transparency in colleges and universities. Toward this end, and to assure efficiency, quality and continuous improvement, a new emphasis is being placed on outcomes assessment in many colleges and universities. Another factor that is influencing collegiate academic programs to implement outcomes assessment is Council for Higher Education Accreditation (CHEA) advisory statements to accrediting bodies (CHEA, 2003). CHEA is the national organization that recognizes accrediting organizations for meeting specific criteria. The essence of this CHEA document stipulates: "accrediting organizations (recognized by CHEA) are responsible for establishing clear expectations that institutions and programs will routinely define, collect, interpret, and use evidence of student learning outcomes."

Two accrediting bodies commonly used by collegiate graphic communications programs are investigating the revision of present accrediting standards to incorporate outcomes assessment for degree programs. The Accrediting Council for Collegiate Graphic Communications (ACCGC) is discussing the revision of its standards to incorporate outcomes assessment. A motion was approved at the ACCGC 2007 Board of Directors Meeting to incorporate outcomes assessment into the ACCGC accreditation standards. Similarly, the National Association of Industrial Technology (NAIT) is beta testing a system for outcomes assessment and will soon require outcomes assessment for accredited programs (NAIT, 2007).

This research presents a practical, six-phase system for outcomes assessment, with examples specifically tailored to graphic communications curricula. The phases include: (1) establish and validate curricular outcomes, (2) align and write competencies, (3) design curriculum, (4) establish measures and benchmarks, (5) measure and analyze results, and (6) revise curriculum. A systematic outcomes assessment plan will provide graphic communications programs with the necessary foundation to continually improve instruction and provide a data-driven rationale for needed resources. The systematic approach will also provide data that may at some point be required by administration for accountability.

Background and Theory of Outcomes Assessment

Essentially, outcomes assessment is a system that degree programs implement to clearly establish and measure the intended outcomes of their programs. It is not enough for the faculty to establish these outcomes through their own perspectives and expertise. Rather, the outcomes need to be validated through any possible number of channels, including advisory board input, external experts in the disciplines and sub-disciplines, and research studies. Once established, the instruction designed to meet these outcomes must be evaluated through a number of possible measures or instruments, including student projects, performance tests, written tests, alumni surveys, and employer surveys. The data collected through the measurement process is then analyzed and used to improve instruction.

Outcomes assessment is becoming the foundation of accreditation. Accreditation originated in the nineteenth century to allow external control over educational standards (Dodd, 2004). Interestingly, the educational standards at the time were intended help ensure the quality of students entering colleges. Prior to this time, students seeking entry into college were required to pass entrance examinations. However, with the increased number of colleges and high schools being established, admission by diploma became an attractive option. Early accreditation also helped establish standards for colleges that made it possible to push some remedial courses down to the high schools (Sims, 1992). Wide-spread accreditation of colleges began in the early 1900's and there are currently six regional accreditation agencies in the United States. Although the American Medical Association had been accrediting colleges since 1847, specialized accreditation through professional associations did not become common until the 1930's (Sims, 1992). Recent years have seen accreditation bodies emphasizing achievement of outcomes as opposed to the strong emphasis that was originally placed on adherence to standards (Dodd, 2004).

Three terms that are closely linked to outcomes assessment are measurement, assessment, and evaluation. Measurement is the process of applying a set of rules, such as a score scale or grading rubric, to gather quantitative or qualitative information (Sims, 1992, Brookhart, 2004). For example, by awarding one point for each correct answer, an instructor may use a multiple-choice exam to measure (quantify) student achievement. Assessment occurs when measurements are analyzed. In the case of the multiple-choice exam, the test score may be used to place the students on an achievement scale (Brookhart, 2004). Finally, evaluation is when judgments about the worth of something are applied to assessments. Once again referring to the multiple-choice exam, evaluation occurs when an instructor assigns a grade (i.e.: acceptable or not-acceptable) to the test score. The relationship between measurement, assessment, and evaluation can be summarized as follows: evaluation includes assessment, which includes measurement (Sims, 1992).

It is also critical to distinguish between formative and summative assessment. Formative and summative assessment deals with how assessment data are used. Formative assessment is a diagnostic tool that provides feedback into the educational process for the purpose of program improvement. Formative assessment is often initiated from within rather than mandated from above, and provides valuable information about how an educational program may be improved. Conversely, summative assessment is generally initiated from above and takes place after instruction is complete. Summative assessment is used to determine whether objectives have been achieved and is largely used for accountability. Summative assessment focuses on the results rather than the process of education (Brookhart, 2004). Outcomes assessment includes elements of both formative and summative assessment.

Another key assessment concept is the distinction between norm referenced and criterion referenced evaluation. Norm referenced assessment compares performance of the individual with that of others, while criterion referenced assessment compares scores with performance standards. Outcomes assessment for program accreditation focuses exclusively on criterion references measures. Osterlind (1988) states there are three important requirements of criterion referenced assessment: a) the performance standards must be clearly defined and measureable, b) measurement instruments must be specifically designed to address the performance standard, and c) measurement data must be interpreted in terms of the specified performance standard.

Brookhart (2004) presents three indicators of assessment quality: validity, reliability, and utility. Validity refers to the meaning and value of the assessment data: essentially, does the data mean what it is supposed to mean? Directly relating assessment data to desired outcomes is good evidence of assessment validity (Brookhart, 2004). Reliability refers to the level of confidence that the assessment data accurately reflects student achievement. In a testing situation, reliability is improved by asking several questions about the same course objective. Taking this to the program review level, reliability may be increased by including several different assessment measures that refer to each of the desired outcomes. Finally, utility refers to the ability to implement an assessment plan within the available constraints of time and resources. In other words, while designing an assessment plan, keep one eye towards the reality of implementing the plan. The methodology presented here strives to have utility for collegiate graphic communications programs.

Outcomes Assessment Methodology

Any outcomes assessment methodology requires a systematic method of establishing the outcomes intended of the instruction and then measuring those outcomes to determine effectiveness and areas for improvement. In addition to faculty input, the outcomes established for the program should be validated through sources outside of faculty expertise. This assures administration and public entities that the program meets the needs of the graphic communications industry. Ideally, the outcomes should be assessed for validity on an ongoing basis, which is particularly important in such a fast changing technological industry such as graphic communications.

The resulting outcomes data can be useful in a variety of ways. First, the data can be used to inform the redesign of curriculum and instruction. Those implementing outcomes assessment should be cognizant of the continuous improvement nature of the system. While the desired outcomes are the overall goal of the program, there will likely be shortcomings that can be addressed through activities such as redesigning course objectives, altering assignments, improvements in equipment and software, and/or enhancements in faculty knowledge base.

Figure 1 illustrates an outcomes assessment model that can be used to provide data-driven decision making to the curricular process. The model shown here is adapted from one suggested by Boser and Stier for Industrial Technology

programs (2005), but simplified to enhance ease of implementation. The phases include (1) establish and validate curricular outcomes, (2) align and write competencies, (3) design curriculum, (4) establish measures and benchmarks, (5) measure and analyze results, and (6) revise curriculum. Each of the phases will be examined with examples for pragmatic implementation.

Outcomes Assessment Model

Establish & Validate Curricular Outcomes

Write & Align Competencies

Design Curriculum

Establish Measures & Benchmarks
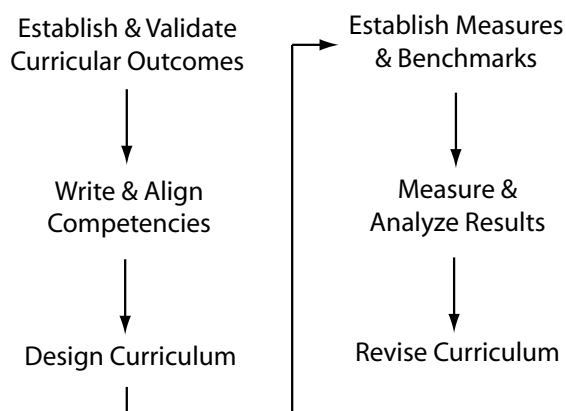
Measure & Analyze Results

Revise Curriculum

Figure 1

Establish and Validate Curricular Outcomes

Curricular outcome statements are similar to time-honored educational goals, but with the philosophical wrinkle of being viewed in retrospect, rather than in a forward thinking manner. The word "outcomes" represents what has been accomplished and what students exhibit as a result of the instructional program, and as such lends itself to measurement and assessment. Curricular outcomes should be broad statements that focus on a component of the program. The recommendation is to limit curricular outcomes to a manageable number of enduring understandings (Wiggins & McTighe, 1998). There are various recommendations on the optimal number of general program outcomes, and the authors recommend from as few as four to as many as ten. Ultimately, these statements will each need to be assessed through data measures and fewer curricular outcomes will simplify the data collection and analysis process (Strong et, al., 2003). An example of one curricular outcome that focuses on prepress technology is given in the outcomes assessment matrix shown in Figure 2.

Curricular outcomes can be established with the help of an advisory board and input from faculty. The specific outcomes written for graphic communications programs will differ depending on the program's focus, size, and comprehensiveness: some programs focus on broad programmatic outcomes and others on more specific areas of graphic communications, like graphic design or digital media development. Professional accrediting organizations, like the Accrediting Council for Collegiate Graphic Communications (ACCGC), expect that programs develop thoughtful outcomes that meet the needs of the students and the larger industry. Unlike PrintED accreditation, which mandates its own set of outcomes that accredited programs must meet, professional accreditation bodies like ACCGC, NAIT, and ABET require that the individual programs develop their own set of goals or outcomes. Once established, the outcomes should be validated through sources external to the program's faculty. Figure 2 illustrates how sources might be referenced to a curricular outcome. The validation process is simply a way to align the established curricular outcomes with contemporary sources of expertise or information. An obvious validation channel will be the program's advisory board. It is recommended that the outcomes be discussed during each boards meeting to keep the outcomes visible and under discussion. Other sources of information for the validation of outcomes may be research studies that focus on curricular needs or contemporary subjects impacting industry. External experts from industry or faculty from other colleges and universities may also support the curricular outcomes as valid. In practice, it may be useful to develop a matrix that aligns the curricular outcomes with the sources of validation. This matrix can be reexamined annually and revalidated.

Align and Write Competencies

Curricular outcomes are stated in very broad strokes, while competencies are stated as behavioral objectives and define specifically what is taught in courses. What is critical for outcomes assessment is that competencies are closely aligned to a curricular outcome. Figure 2 illustrates how competencies, and the specific courses in which those competencies are taught, might be aligned to a curricular outcome: in this case for prepress skills and knowledge. In practice, the competencies defined in a syllabus for a course are examined for alignment with the curricular outcome. Because there might be hundreds of specific competencies taught, it is not practical to validate, assess, and document each individually as a stand-alone entity. Rather, by way of deduction, assess-

Assessment Example: GC Outcomes Assessment Report 2008

#	GC Outcome Assessment Report Spring 2008		Assessment Methods and Outcomes		
	Curricular Outcome	Related Course	Performance Criteria Assessment	Grad Follow-Up Items	Employer Feedback
1	Use modern applications and methods to compose and manage production-ready media for both print and display distribution.	TEC 250, 352	(a) *70%; (b) 93%; (c) 81%; (d) *77%	*3.5/5.0	4.5/5.0

#	**Related Competencies**	Related Course
1	Use page layout, image editing, and illustration applications in the creation of a variety of documents.	TEC 250
2	Setup style sheets and master pages for automated and productive page layout workflows.	TEC 250
3	Manage fonts and typeset text effectively.	TEC 250
4	Collect and manage all necessary document files for digital output.	TEC 250
5	Synthesize documents into well-structured PDF files.	TEC 250
6	Build a flat database, create a variable data document, and print the document to a digital press.	TEC 250
7	Follow a preflight checklist to analyze and repair documents for print media.	TEC 352
8	Collect, assign metadata, and manage all file elements belonging to documents.	TEC 352
9	Create, troubleshoot and edit Portable Document Format (PDF) files for various end uses	TEC 352
10	Properly trap a variety of documents using both RIP software and native application programs	TEC 352
11	Design imposition templates using imposition application software and create print-ready imposition layouts	TEC 352
12	Proof and output jobs using various output technology, including RIPs, platesetter designs, and digital proofing devices	TEC 352

*Indicates benchmark not met

Assessment Benchmarks

GC performance criteria: at least 80%

Grad Follow-Up Survey: Average of >= 4.0/5.0 indicates well prepared.

Midterm Exam (TEC 352): Average 80%

Final Exam (TEC 352): Average 80%

Instrument Key

(a) Manual Preflight & File Repair (TEC 352); (b) Intergrative pre-press assignment (TEC 352); (c) Midterm exam (TEC 352); (d) Final exam (TEC 352)

Competencies of Concern

#5; 7; 9

Response/Action Fall 2009

Assessment points to PDF repair performance and knowledge remaining too low. We will move to Adobe InDesign in fall 2008 in TEC 250 and increase PDF creation and application work. Hopefully, TEC 352 will begin at a higher level from the outset with students having more advanced knowledge of PDF from TEC 250. Another assignment will be added in TEC 352 focusing on PDF editing with Acrobat and PitStop to enhance knowledge.

#	**Validation Sources**	Validation Date	**Comments**
1	Advisory Board Approval	5/10/08	
2	Pfister, S. Survey explores the role of PDF in the enterprise [Electronic Version]. The Seybold report: Analyzing publishing technologies,18-21.	5/1/08	Though study is dated 2004, study was demed still current through republication.
3	Idealliance (2007). 2007 Guidelines and Specifications (GRACoL, SWOP, DISC)	5/1/08	
4	Waite, J. (2006a). What to teach graphic design students about printing industry guidelines. Visual Communications Journal, Spring 2006. 23–34.	5/1/08	References content and current industry specifications
5	PDF Print Production, PIA/GATF, 2008	5/20/08	An industry best seller & guide to PDF use in media

Figure 2

ment data gathered on the curricular outcome can inform the individual competencies. What's more, the process of aligning competencies to curricular outcomes can result in important information about a curriculum. The exercise can pinpoint holes in the curriculum and excessive overlaps.

Design Curriculum

As college and university faculty, much of our time is spent designing curriculum for our courses. In most programs, individual faculty have a set of assigned courses that they develop based on their own expertise and experiences. What might be lacking is a cohesive system of curriculum development and improvement that is regularly informed by data. Outcomes assessment data can be used to provide a backdrop for tweaking content or for completely redesigning outdated courses. Ultimately, the system is one of continuous improvement, where shortfalls in outcomes can be identified and instruction redesigned to help meet the outcome in the future. It is critically important for administrators or accreditation reviewers to understand that falling short of an intended outcome is not a failure, but rather a step in the necessary process of change and improvement.

Establish Measures and Benchmarks

By its nature, outcomes assessment data derived from course tests and projects require a criterion-referenced evaluation. Thus, the design of assignments should include rubrics defining the criteria upon which it is evaluated (what the students should be able to do and to what level). In practice, it is also useful to perform an item analysis on tests, which can help the instructor pinpoint specific topics within the test that are of concern.

The assessment of outcomes can become overly complex and nearly impossible to manage. It is critical to develop measures that are broad based and somewhat comprehensive in nature. Thus the measures should align with the curricular outcomes. Measures should come from a few key sources, such as instructional evaluations like performance tests, written tests, and major projects. For example, Figure 2 illustrates the curricular outcome measured through an integrative prepress project that includes preflighting files and PDF generation. Another project involves trapping, imposition, and proofing. The projects selected should ideally be integrative in nature. Programs with capstone projects might use the evaluation of these projects to evaluate several curricular outcomes.

Other sources of measurement should include surveys to recent graduates working in the graphic communications industry and the employers of recent graduates. Online surveys are now quite convenient and inexpensive to develop and administer. A Likert-type scale can be developed to assess each of the curricular outcomes, email links can be sent to the targeted individuals, and useful data can be generated from the survey results. For richer information, and because the curricular outcomes are so broad, comments can be solicited on the survey to gather specifics on why items might have been rated low. Numerical benchmarks must be developed to determine whether or not the outcomes have been sufficiently met. There is some interpretation required here. Faculty should collaborate on what a reasonable level of competency might be for each of the various measures and then agree on the numerical values.

Measure and Analyze Results

A variety of measures can help corroborate and strengthen conclusions drawn from the data. Comments can be compiled from survey data, while tests and projects can be analyzed to determine what specific areas need improvement. Further, some interpretation may be needed to define exactly where students and graduates are falling short. For example, a final exam may indicate that most students understand imposition planning, but a low percentage of students can effectively repair media box and bleed problems in a PDF file. This analysis would be recorded as a specific weakness. In the example provided in Figure 2, the analysis of results shows that competency number 1 and number 4 are specifically of concern. In practice, it might be rare to have the entire curricular outcome and all of its aligned competencies fall short of the benchmark. More likely, analysis will show specific competencies that show weaknesses. These should be identified through the process of analysis.

Revise Curriculum

Once the weaknesses have been identified through the analysis of data generated from the measurements, the revision of instruction should follow. The process of outcomes assessment will pinpoint where instruction should be modified. It is then the responsibility of the faculty to design creative alternatives to help achieve the outcome. The modifications to curriculum and/or instruction should ideally happen the next time the course is offered so when outcomes are measured again, a fair judgment on the effectiveness of the instructional change can be made. A report on

the improvement of the program can be kept fairly simple by detailing the response/action as shown in Figure 2. This phase of outcomes assessment allows faculty to use their creativity and expertise to meet the established outcomes.

In some cases, the results of outcomes assessment may point to a need for more modern equipment or additional training for faculty. The need for funding can be articulated and better justified to the college or university administration provided there is data-driven outcomes assessment in place. The implementation of outcomes assessment does not, of course, assure additional funding for faculty development or equipment, but can help make the case more effectively.

A Significant Effort

Faculty and administrators need to understand that outcomes assessment requires a commitment of significant time. The authors recommended that one individual be given the responsibility for tracking and maintaining the assessment effort, but all program faculty remain engaged and involved in the process. The individual who is responsible for the assessment will need to design the forms, work with faculty of the various courses to identify key projects and tests for benchmarking, collect data from faculty who teach the courses, prepare surveys for employers and graduates, synthesize the data and share results, and request plans for changes that might help improve instruction where outcomes fall short. Also required will be efforts to validate the outcomes by such methods as soliciting feedback from an advisory board and by researching industry standards, specifications, reports, and published articles. The effort is significant, and will require on-going commitment and support of all involved.

Summary

The political climate in the U.S. today suggests a need for greater accountability and transparency in higher education and has led many college and university administrations to place a greater focus on assessment for academic programs. Professional accreditation organizations have or are in the process of incorporating outcomes assessment into their standards to help assure quality and continuous improvement. Educators can be assured that outcomes assessment is here to stay and it may behoove those in positions of leadership to embrace and implement outcomes assessment into their programs. A system of outcomes assessment will likely be required for those programs seeking professional accreditation.

The benefits of outcomes assessment are many. The system requires faculty collaboration in the curriculum process. It is recommended that meetings be scheduled at the end of each semester or quarter for faculty to report on measures and exchange ideas for revisions in instruction. The outcomes assessment plan also should become a regular part of the advisory board meeting. The advisory board will have regular input on curricular outcomes and advise on competencies, as well as hear reports on improvements and weaknesses as determined by the data. Outcomes assessment data can point out deficiencies in lab for equipment and software, allowing program leaders to present better, more compelling rationales to industry donors and to college and university administrations.

The information in the literature on outcomes assessment is complex and multifaceted. A pragmatic system for outcomes assessment is here presented for graphic communications programs to meet the requirements of higher education institutions today. While there are varying approaches to outcomes assessment, it is important that the system adopted is simple and practical to administer on an ongoing basis. The system presented here involves faculty, students, advisory committees, employers, outside research, and industry to assure ongoing continuous improvement.

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This is a juried article.

Student Perceptions of Technologies Used to Teach a Graphics Course Online

by Dr. La Verne Abe Harris, Purdue University, and Dr. Carl Blue, University of Northern Iowa

Abstract

This article describes a pilot study for identifying graphics student perceptions of technologies used in an online learning environment. These findings can be used to develop strategies in building graphics courses online. A graduate-level graphics course was developed which included knowledge modules being delivered online using a variety of available cowmmunication technologies. An online survey was developed to determine attitudes pertaining to each emerging technology used. This study focused on an exchange of ideas from the perspective of those participating students. Based upon this study, which was implemented in one of the largest public universities in the United States, the authors have found that those online learning technologies were perceived by graduate students as beneficial, but both professors and students need to approach teaching and learning differently in order to be successful online.

Background

The future of education and training will be independent of time and place. Forthcoming learners will have access to a wide range of media, as well as sources of education (Billings et al., 2001). Today in higher education there is a progressive commitment toward online distance learning from both the administration, which sees it as a way of cutting costs and increasing headcount, to the growing number of students who want to have the option of online learning (Gibbons & Wentworth, 2001). To address this development in higher education, many proactive graphics programs are offering more courses utilizing Internet technologies. In developing these online resources for the graphics student, what are the principal strategies considered necessary for the university professor to deliver and develop proactive student-centered learning? Can faculty make effective use of the online platform to design, construct, and deliver a meaningful online course that addresses the motivations, needs, learning styles, and constraints of nontraditional learners, while achieving the same learning outcomes as face-to-face classes? In addressing these requisites, academic research needs to focus on accumulating best practices for developing online curriculums that concentrate on addressing the perceived online experience for students.

Professors are experts in their subject matter, but are not necessarily experts in face-to-face or online teaching. Delivering online instruction is a relatively new phenomenon for many professors and few consider themselves an expert at online technology (Odell et al., 2003). The significance of a compilation of best practices in a graphics curriculum should provide the educator with a better awareness of the computer jargon common to online learning environments, a greater familiarity with online teaching and learning expectations, and a greater understanding of the current media hype about Internet technologies. This study will offer a glimpse into the educational assessment of online educational practices. This shift from knowledge being fixed to a certain time and place, to knowledge being accessible at anytime and at any place, creates the potential for a change in the way students learn (Gold, 2001). The development of Internet-specific skills is seen as essential preparation for students in their professional life (Bennett et al., 1999).

O'Malley (1999) conducted a study with 14 undergraduate students in a medium-sized university, and found that online technologies are perceived by students as "having some benefits although they are not necessarily knowledge related" (pp. 1). A previous study conducted by Harris, Duff, and Lestar (2007) with undergraduate students, found that online coursework has developed alongside traditional face-to-face instruction, but it has not developed a standardized, identifiable, and accepted pedagogy. In the same manner that teachers and instructional designers bring pedagogical biases to their courses, students bring biases in the way they learn. The Internet and other communication technologies provide educators with a wide array of educational tools to create highly interactive and effective learning environments (Buell et al., 2001). Additionally, the Internet can offer online students the opportunity to interact with one another and with the university, and to access a range of study related resources electronically (Bennett et al., 1999). It is worth noting that the degree of collaboration depends largely on the ability of educators to respond to the requirements of the neophyte knowledge society in the process of intertwining practice and pedagogical ideas through online systems (Campos et al., 2001).

Methodology

This paper is explorative in nature and uses an investigative study, rather than theory-testing academic research. This study examined a graduate graphics course (Cross-Media Design Solutions), which was delivered in the 2007 spring semester at Arizona State University. The participants in the study included a small sample population of 18 students ranging in age between late teens and mid 40s. Fifty-five percent were female and 45% were male. There were 13 full-time and five part-time working members in the sample. Overall, the students in the study were representative of the graduate students in the graphic information technology face-to-face classes at Arizona State University. The only difference was that some of the graduate students, who were working professionals in the field of graphic communications, now had access to a university graduate course that could fit around their work schedule.

Measuring cognitive learning or comparing a control and experimental group are not within the limits of this paper. This study focused on finding the benefits and challenges of the online experience from the perspective of the student. Additionally, the study examined how students perceived learning and teaching success and use of technologies in an online learning environment. Those approaches included: PDF lecture deliveries, Media-Site lecture deliveries, multimedia tutorials, iPOD™ lectures, and weekly exercises that included personal profile webpage development, general discussion boards, and online reading assignments and exams.

The online survey posted at the end of the semester utilized a mixed methodology of online questionnaires posted on Blackboard, an online course learning system. These indicators were based on a combination of existing surveys for online learning and technologies. The 38-question instrument utilized a Likert scale of choices and open-ended responses (Refer to Appendix A).

The results of this study will help in developing strategies for best practices in developing future graphics online courses. Even more important is the emergent use and community understanding of Internet communication tools and virtual community environments in accomplishing authentic problem-solving and real-world tasks (Johnson, 2001). Online learning research in the selected studies can inform us in regard to variables and best practices that may form the basis of future research (Odell et al., 2003). Future studies are proposed from the perspective of the teachers and industry leaders.

Results and Analysis

The strategies of the curriculum developer should consider delivering proactive student-centered learning with the expansion of online courses. This study has focused on accumulating best practices for developing constructive online curriculum. The significance of a collection of this information should provide the professor who is faced with the challenge of teaching an online course with a better understanding of computer jargon in online learning environments, and a greater familiarity with online teaching and learning expectations. It should also continue the academic conversation about educational assessment of online educational practices.

Benefits

When the participants were asked what they believed was the greatest benefit to taking an online course, 33% of those sampled stated that "flexibility" was their top benefit, while 67% stated that "convenience" was their top benefit to taking online courses. Though this open-ended question is qualitative, the responses were quantifiable because of their identifiable character. Other benefits include: No commuting, accessibility 24-7, self-sufficiency, resolved time conflicts with other courses or work, ability to work at your own pace and from the comfort of your own home, and access to everyone's comments and suggestions. One participant noted that it should be mandatory for every university graduate to take one or two online courses. The skill sets, such as sending attachments, independent learning, troubleshooting, Internet searching, interactive training, and communication, can be transferred to the workforce.

Challenges

When the participants were asked what they believed was the greatest challenge to taking an online course, the group gave answers that included motivation and self discipline. They also commented that it was easy to be distracted and that the responsibility for learning rests with the student. They also remarked that there were requirements of time management and heavier workloads—along with more freedom—that they had to face.

One challenge was the lack of body language that was missing in an online experience. This was particularly difficult for students who expressed a personal need for face-to-face interaction. Once they adapted to using symbols for emotions and understood the online etiquette, the lack of body language was less of a challenge. Communication problems were identified when there was a lack of understanding the directions for assignments or searching online libraries. Some participants had communication issues with some peers associated with group projects. Students also responded that sometimes they had technical difficulties. They realized that they should have paid closer attention to the minimum technical requirements of the course, because their inadequate computer technologies in the home caused problems with some of the streaming video.

Student Success

A successful online student must have more initiative and self-discipline than a face-to-face student, because he or she has to manage a limited amount of time. A successful online student's self-motivation stems from the student having an avid interest in the subject matter, seeing its value, and applying it to his or her current job. Successful students were identified as lifelong and independent learners. They were comfortable with the online format. This group of participants identified themselves as either a parent with children at home, or a working student, and had little time to spare. So, they were forced to be organized. Additionally they identified themselves to be self sufficient and self-disciplined students.

An unsuccessful online student profile was identified by the participants as needy and requiring "hand holding." Unsuccessful online students tended to be unorganized and have issues of poor time management. They misunderstood written instructions, had trouble with self-motivation, lacked independence, and had trouble working alone. These students needed more face-to-face interaction and more self discipline. They had trouble meeting deadlines.

Teaching Success

According to the students in this study, a successful online teacher is one who is a good communicator, since online teaching requires more interaction with students than traditional face-to-face environments. Successful

teachers embrace technology and are technologically savvy. They tend to understand Murphy's Law of probability and have contingency plans if something goes wrong. These teachers tend to be organized and capable of explaining course content with visual examples that visual learners understand. They are passionate about teaching and willing to clarify their assignments. The successful teacher provides virtual office hours (time available online).

A professor who should not teach online is one who is disorganized, unmotivated, a poor communicator, or is unresponsive to students in a timely manner. This type of person should not teach in the classroom either; however, these traits seem to be exaggerated in an online environment. The unsuccessful online teacher does not understand the full capabilities of technological teaching tools, refuses to accept that the digital age is here, and that the Internet is a valuable resource, and takes a long time posting grades and replying to student postings.

Online Teaching and Learning Approaches

PDF Lecture Delivery

When the participants were queried on whether or not the magazine lecture, delivered as a PDF file, utilized a mode of delivery that was useful to them, eight individuals strongly agreed, and 10 individuals agreed. Some of the comments posted included: "It is good to be able to print out a lecture and read at a convenient time (while riding the bus)." "This is like teaching yourself."

Media Site Lecture Delivery

Figure 1

Media-Site™ Lecture Delivery

When the participants were queried about their perception of a branding lecture that was delivered as a broadcasted Media-Site™ lecture, which included an audio-video of the professor and a PowerPoint™ presentation, eight of the individuals strongly agreed that the experience was positive. Seven individuals agreed, two individuals disagreed, and one student strongly disagreed that it was positive (http://www.mediasite.com/). Students liked the combination of visual and auditory learning. One student said that his computer froze during the lecture. Course designers should make sure to post and require the minimum level of computer power necessary to utilize applications.

Sound Bite Lecture Delivery

When the participants were queried whether a lecture that utilized sound bites with no visuals was a useful online learning experience, four individuals strongly agreed, nine individuals agreed, four individuals disagreed, and one student strongly disagreed. Some of the comments posted included: "I needed better concentration skills to learn from audio delivery, yet the advantage was that I could replay the sound bites." Visual learners needed the option to hear and see and found that audio delivery worked if the textbook had supplementary visual examples.

Multimedia Tutorials

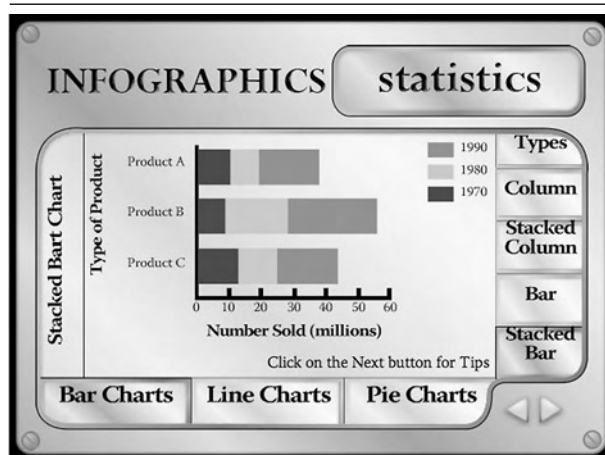**Multimedia Tutorial Delivery**

Figure 2

Interactive Flash™ tutorial

When the participants were queried whether the typography module that included interactive online Flash multimedia tutorials was found useful to their online learning experience, five individuals strongly agreed, eight individuals agreed, three individuals disagreed, and two students strongly disagreed. Some of the comments posted included both positive and negative observations. Positive comments included learning at your own pace, interactivity, and use of color. The tutorial made topic easier to understand. Having the control to repeat parts of the lesson, as well as have the written words in the tutorial was deemed helpful.

iPOD™ lectures

When the participants were queried whether they would be open to an iPOD™ lectures, they responded that they were open to this teaching approach if they owned an iPOD™ or other MP3 device. Several who did not own one did not understand that the iPOD™ lesson can be played on the computer as well. One student responded that she found this lecture delivery very useful, because she was able to take care of her baby while she played the lecture on her iPOD™.

iPod™ Delivery

Figure 3

Weekly Exercises

Personal Profile Webpage

One class exercise involved the posting of a one-page Web page profile, much like a 30-second self commercial. The exercise included a photo, a bio, favorite external links, and optional links to resumes or portfolios. This was a great way for students to network with other professionals. When the participants were queried about this assignment, they unanimously responded by saying that this feature of the course was helpful in getting to know the other virtual students.

Discussion Boards

General Discussion Board

When the participants were queried whether the general discussion board was beneficial, some of the comments posted indicated that it was similar to face-to-face participation and question and answer sessions of a traditional classroom, because students could respond online to one another's questions. When the participants were queried whether the general discussion boards for online discussion were similar to asking for clarification of an assignment in class or having open discussions, six of the students strongly agreed, 11 students agreed, and one student disagreed.

Topic Discussion Board

Each week a different analysis question was posted by the professor, and could not be answered without the student reading the weekly materials. This was similar to an essay question. The students were required to cite at least two references (one being the textbook). The answer had to be written without opinion and from the literature review. The citing and references had to be in APA Style. Each student had to then respond to two other postings. This meant that each posting required advance research. This was an opportunity to carefully answer the question giving evidence to support the response, which meant that outside reading had to occur. Waiting for the responses was the most frustrating part for many students.

When the participants were queried on whether the topic discussion boards for online "Question of the Week"

was similar to robust classroom participation, four of the students strongly agreed, nine students agreed, four students disagreed, and one student strongly disagreed that it was as robust as classroom participation.

Weekly Reading Assignments

Some of the comments posted included remarks about the similarities of the weekly reading assignments to that of any other university face-to-face course. It was expected at the graduate level.

Online Projects

Electronic project drop boxes were available on Blackboard for students to post their individual and team projects.

Weekly Projects

When the participants were queried whether having weekly projects due at the same time each week was helpful, 13 of the students strongly agreed, and five students agreed.

Virtual Team Project

Students had to present a team proposal to develop a website for a new National Football League (NFL) team.
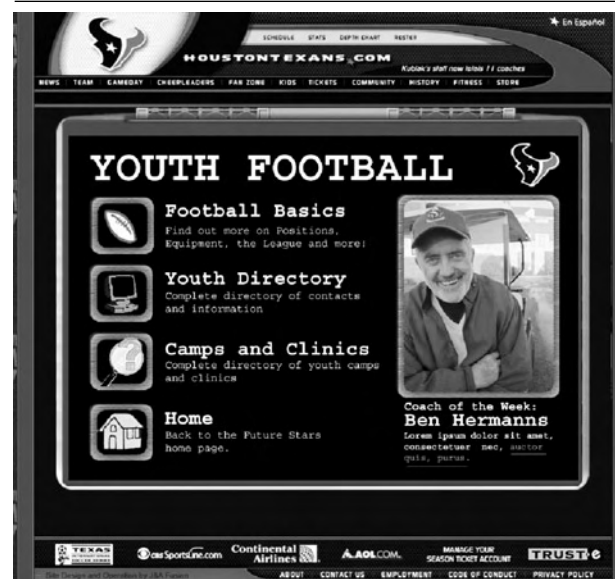
Virtual Team Project Delivery

Figure 4

Some of the comments posted included how surprised they were that group coordination took more effort than face-to-face efforts. The lack of facial reactions (body language) for the group members made communication more difficult and group members' different working pace caused frustration. Some of the comments posted included suggestions to utilize real-time collaborative software, such as Google-Docs™ or Breeze™ for conferencing. Since virtual team projects take more coordination effort, schedules and tasks should be set as early as possible and with defined deadlines. Team members should respond to each other often and keep in constant communication. They should understand and respect each other's schedules, be reliable and responsible, meet deadlines, and appoint a strong leader who is proactive.

Online Exams

Electronic project drop boxes were available on Blackboard™ for students to post their topics, outlines and papers. Since this was a graduate course, the midterm and final exams were papers on graphic information technology research. A writing template was posted. Students had to write as though they were submitting the paper for a journal or a conference presentation. Topics had to be approved in advance. An outline of paper had to be approved in advance.

Additional Observations

Some of the additional comments posted on the overall course included comments that the favorite parts of the course were the team project, seeing the grades posted online, and working on interesting assignments.

Participants commented that the best way for online learning include finding a distraction-free area to study with no TV and no family interruptions, setting deadlines for themselves, understanding that learning visually is different from auditory learning, and checking often for online announcements and discussions.

When many of the students initially enrolled in an online course, they expected a self-paced laidback atmosphere, and they were surprised at the fast pace of the course and the academic demands required to be successful in the online graduate course. They were also surprised at the amount of peer interaction that can take place online, and found that the virtual community that is built around having chats and working together on a project is very engaging.

Conclusions

The results indicated that graphics courses can be taught successfully online using different technologies, but both the professors and students need to approach teaching and learning differently in order to be successful online. The significance of this collection of student perceptions should provide the professor with better understanding of the computer language associate with online learning environments. The information provides a greater familiarity with online learning expectations. The goal of this study was to explore a survey of student perceptions of online teaching and learning in order to develop better strategies and best practices in developing graphics distance learning courses. The results focused on the exchange of ideas coming from the perspective of the student. Conclusions found that when comparing distance learning practices to face-to-face interactions, the need for a higher levels and dedication in communication between the student and the professor is needed. When it comes to addressing the important issues of quality and effectiveness of technique in distance learning environments, emphasis is placed on continuity, repetition and style of instruction and content delivery. Additionally, the development of an intuitive interface is beneficial along with detailed instructions for assignments. There was also an observable emphasis of the importance of online etiquette, as well as the noted benefits of available technical and research help desk resources. Ultimately, the results found that graphics courses can be taught online successfully, but with different ways of learning and different ways of teaching. Future studies are proposed to gather information from the perspective of the professors.

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APPENDIX A: Cross-Media Survey

Demographics:

1. What is your gender? Female, male

2. What is your academic status? Graduate student, senior undergraduate

3. My age range is: 18 to 21 years of age, 22-29 years of age, 30-39 years of age, 40 or older

4. This best describes my working situation: I work fulltime in a field related to graphics IT and I am attending college; I work fulltime in an unrelated field while going to college; I work part-time (or freelance) while I am attending college fulltime; I am a fulltime student and I do not work.
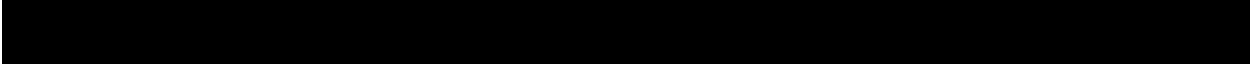
Online Course Questions

5. What do you believe makes a student successful at learning online?

6. What do you believe makes a teacher successful at teaching online?

7. Week 1 of your Cross-Media Design Solutions, you created a homepage student profile of yourself. This feature was very helpful.

   Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

8. Week 1 of your Cross-Media Design Solutions, you created a homepage student profile of yourself. What could make this feature more useful?

9. Week 2 visual communication was presented with PDF articles, PDF chat protocols and examples, a posted Powerpoint presentation on the design process, along with posted text and sketch examples. What components to the information did you like the best and why?

10. Week 3 New Media you worked on a team project. What was your overall experience?

11. Week 4 Design lectures were presented using sound bites only with no visuals. This was useful to my online learning experience.

    Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

12. Week 4 Design lectures were presented using sound bites only with no visuals. Why or why not did you find this useful to your online learning experience?

13. Week 4 Design and Week 5 Typography: The weekly assignments consisted of interactive Flash tutorials. I

found the multimedia to be useful to my online learning experience.

Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

14. Week 4 Design and Week 5 Typography: The weekly assignments consisted of interactive Flash tutorials. Why or why not did you find the multimedia to be useful to my online learning experience?

15. Often in graduate education, weekly reading assignments are discussed without a formal lecture. Week 6 Art: The reading assignment was used instead of a formal lecture and discussed online. Did you have a problem with this format? Why or why not?

16. Week 7 Magazines: The lecture was delivered as a PDF file. This mode of delivery was useful to me.

Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

17. Week 7 Magazines: The lecture was delivered as a PDF file. Why or why not was this mode of delivery useful?

18. Week 8 Newspapers: Information to clarify the concepts was added after the module was posted. I found this to be disruptive to my online learning experience.

Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

19. Week 8 Newspapers: Information to clarify the concepts was added after the module was posted. Why or why not did you find this disruptive to your online learning experience?

20. Week 9 Branding: Mediasite was used to produce the broadcasted lecture with the faculty and the Powerpoint. This online learning experience was very positive.

Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

21. Week 9 Branding: Mediasite was used to produce the broadcasted lecture with the faculty and the Powerpoint. I liked or didn't like this online learning experience because...

22. Week 10 IDeaLaboratory Concept: The lecture was presented in an interactive format with audio and animation. This online learning experience was positive.

Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

23. Week 10 IDeaLaboratory Concept: The lecture was presented in an interactive format with audio and animation. This online learning experience was positive or negative because...

24. Topic discussion boards for online discussions is similar to classroom participation.

Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

25. Topic discussion boards for online discussions is or is not similar to classroom participation because ..

26. General discussion boards for online discussions is similar to asking for clarification of an assignment in class or having open discussions

Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

27. General discussion boards for online discussions is or is not similar to asking for clarification of an assignment in class or having open discussions because...

28. Having weekly projects due at the same time each week was helpful to me.

Strongly Agree, Slightly Agree, Neutral, Slightly Disagree, Strongly Disagree, Don't Know or NA

29. If you have taken an online course using Notebook software (triangles and index format), such as GIT450/598, GIT 337, GIT 414, etc. what is your take on presenting course information in that format? If you have not had this experience, answer NA.

30. The thing I liked best about the virtual team experience was...

31. The thing I liked least about the virtual team experience was...

32. My favorite online learning experience for this course was...

33. I would or would not sign up for another online course, because...

34. If I were to give one suggestion for developing online courses, I would say ..

35. What major obstacles did you have in your online experience?

36. What were the biggest advantages to taking an online course?

37. How does this course compare to any other online course you have taken? If this is your only online experience, answer NA.

38. What would you like to be done to improve this online course in the future?

This is a refereed article.

Teaching Online and On-campus Students

by Dr. Robert Chung, Rochester Institute of Technology, School of Print Media

Abstract

To echo the theme of the 2008 IGAEA Conference, "Cruising the Classroom—Innovation for Tomorrow's Teachers," the author shares his online experiences in teaching digital imaging and color reproduction. There are several essential factors to the success of online teaching and learning: (1) the maturity of computer, Internet, and World Wide Web technologies, (2) friendliness of the academic environment, (3) robustness of online course management systems, and (4) ways to enhance learning and interpersonal relationship. When online course management system is applied to on-campus teaching, it is called blended learning. The author also discusses a recent survey of faculty opinions on blended learning at Rochester Institute of Technology and his own experiences in teaching a printing technology course both online and on-campus.

Introduction

I was hired to teach at Rochester Institute of Technology in 1980 because I was a subject expert, not because I knew how to teach. The good thing is that I like teaching. I eventually learned how to teach after many years of classroom experiences.

Teaching involves designing or revising a curriculum, preparing or updating instructional materials, and communicating with students in a classroom and in a laboratory. In a sense, the classroom is where most of teaching and learning take place. At the end of a term, I have the opportunity to assess what works and what does not. I would make necessary curricular revision before starting over again.

I have been teaching color imaging and its reproduction for many years. Imaging and prepress side of the graphic arts technology moved from film-base media to digital media in early 1990s. I adopted computer-based color imaging tools in order to keep curriculum current. I became proficient with computers and a variety of application software packages.

As computer hardware and software continued to improve and Internet technology became available, information dissemination and retrieval became ubiquitous. This made online or distance learning possible. Students can take courses outside of traditional classrooms anytime and anywhere. Likewise, teachers can instruct their students anywhere and at anytime. The virtual classroom that removes the constraints of place and time motivated me. I taught my first online course, Imaging Technology, in 1998.

Objectives

The theme of the 2008 International Graphic Arts Educator Association (IGAEA) Conference is "Cruising the Classroom—Innovation for Tomorrow's Teachers." It is fitting that I describe my experience in cruising the classroom via the Internet. First, I will outline important factors in order for online instruction to work. Second, I will discuss the use of online course management system for on-campus teaching. I will also discuss correlations between online learning and on-campus learning ascertained from student feedback.

Teaching Online Students

I asked myself what are the criteria for successful online instruction. I came up with the following four crucial factors: (1) the maturity of computer, Internet, and World Wide Web (WWW) technologies; (2) friendliness of the academic environment; (3) robustness of online course management system; and (4) ways to enhance learning and interpersonal relationship as individuals and teams. Below are elaborations of these factors.

Maturity of Computer, Internet, and WWW Technologies

As we witnessed vast changes in computer operating system, chips, memory, and speed in the past twenty years, sMoore's Law stands correct, i.e., "the number of components the industry would be able to place on a computer chip would double every two years" (Intel, 2008). I encountered replacement of my computers just about every three years to keep up with the pace of the advancement in computer technology.

The Internet is a collection of interconnected computer networks, linked by copper wires, fiber-optic cables,

and wireless connections. In contrast, the World Wide Web (Web) is a collection of interconnected documents, linked by hyperlinks. The Web is one of the services accessible via the Internet, along with various others including e-mail and file sharing (Wikipedia, 2008). Like cars and airplanes that shaped the transportation industry, it is the speed of the computer and the ease of moving data with the use of Inter-based browser that made online instruction possible.

Friendliness of the Academic Environment

From the university's point of view, online teaching has the potential to increase student enrollment without increasing physical resources of the institution. RIT is a technology astute institution. It created the Online Learning Unit to support a number of online degree programs available to off-campus students.

My involvement in online teaching was the result of the School of Print Media offering a digital imaging certificate to non-matriculated students. I received instructional support from RIT Online Learning. I also received release time to develop digital assets to support the online course. I included online curriculum development activities as merits in my annual faculty review. Thus, I have a very friendly academic environment that fostered my ability to teach online courses. Without the friendliness of the overall academic environment and the support of my school's administration, I would not have embraced online technology the way I did.

Robustness Of Online Course Management Systems

An online course management system is a virtual classroom where instructional materials, communication, quizzes, tests, drop box, and grade book are organized and accessed by registered students and the instructor. myCourses (term coined by RIT), is an icon-based Internet browser (Figure 1). The current Web-based platform was developed by Desire2Learn, Inc. It is the fourth online course management system I have used since 1998 after FirstClass, Blackboard, and Prometheus.

At a quick glance, myCourses is structured, explicit, and text-based. When listening to liberal art and social science faculty members at faculty online workshops, I found that faculty members are satisfied with text-based

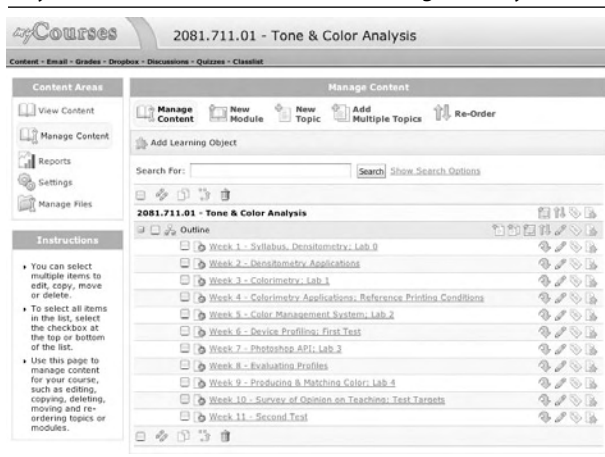**myCourses, a Browser-Based Course Management System**

Figure 1

"teaching presence." Teaching presence is defined as "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing educational outcomes" (Garrison, et al, 2001). A good example of text-based interaction is a threaded discussion.

I found text-based interactions limited in teaching presence and demanded image-based communication including sight and sound. When computer and Internet speed were slow, I would record lectures in a studio, add captioning, and package them as VHS tapes that were available to students. As the Internet speed improved, videotaped lectures were replaced by streaming videos. Students access these lectures via hyperlinks. When watching videotaped lectures, students could rewind me in the middle of a lecture as if they had asked a question, "What did you just say?" They can view the entire lecture again to achieve deeper understanding of the subject.

Good planning is key to online teaching and digital assets preparation. It would take me more than ten weeks to record all the lectures in a ten-week course. Initially, it was necessary to re-record two to three lectures due mostly to content changes. I learned to only include theory and conceptual aspects of instructional materials in videotaped lectures and keep time-limited materials, e.g., software features, in laboratory assignments.

A virtual classroom with streaming video may be as good as a traditional classroom in disseminating lecture-based information. But transforming hands-on learning from a real laboratory to a virtual laboratory falls short. A

case in point is the Color Management System Lab in the School of Print Media. It has many state-of-the-art color measurement instruments and color management system programs. As an instructor, I cannot demand students spend a huge sum of money to purchase these highly specialized hardware and software. The best I can do is to provide videotaped demonstrations on the use of a spectrophotometer for data collection and on the construction of ICC profiles. I, then, upload the resulting files on the server for students to carry out the rest of the laboratory assignment. Students often commented that demonstration did not match hands-on learning.

Under the Content header of myCourses, I organize instructional materials by week (Figure 2). Students can download lecture outlines and lab instructions as PDF, see the reading assignment, view videotaped lectures via

Weekly Teaching and Learning Activities

Topic:
Colorimetry: Lab 1

Class Plan
1. Streamed video on Colorimetry (length: 01:25): (Click to view)
2. Outline on colorimetry: (Click to download)
3. Go to Quizzes and take the quiz on colorimetry.

Assignments
1. Lab 1 Press Sheet Analysis: (Click to download)
2. Lab 1 checklist: (Click to download)
3. Using XRite 530 with ToolCrib: (Click to download)
4. Excel template: (Click to download)
5. IT8.7/3 (Basic): (Click to download)
6. N7A.tif: (Click to download)

Useful Web Sites
SWOP: (Click to link)
GRACoL: (Click to link)

Required Readings:
• **Textbook** - Chapter 3—Color Management

Figure 2

RealPlayer, and take self-quizzes or tests online.

Routine communication takes place in a number of touch points. Weekly Announcement is the first thing students see when entering the myCourses. I use email to handle personal matters. I usually lead in the open threaded discussions by prompting a few thought-provoking questions relevant to the subject matters studied. Students were asked to respond to these questions. I would monitor various discussion threads, comment or praise their postings. As a personal reflection, threaded discussion is like a "life line" to online students. This is

where they exercise critical thinking and problem solving. Outcome of the discussion often were used in the essay part of online tests.

The online technologies mentioned thus far support asynchronous communication. Yet, there was a strong desire on the part of online students to have more contact with the instructor in a synchronous manner, i.e., same time, anywhere. I conducted text-based chat sessions, voice-based telephone conferencing, and most recently, web conferencing using Adobe Connect. When there is a hearing-impaired student enrolled in the class, RIT mandates that text-based captioning be included in the session.

Private group discussion areas are set up to support group projects. Why group projects? A group project helps create synergy and collaboration among a team of learners. However, group dynamics has been a variable and cannot be assumed. I survey the students at the beginning of a term, group them as teams of two or three based on a few self-rated criteria, i.e., ability to write, ability of lead, ability to use software for documentation, calculation, and image processing. Only one score is given to a team report. A student has the right to back out of a team and acts individually in completing his/her lab assignments. My experience has been that the quality of the group report is usually higher than that of individual report. Indeed, it is rewarding to read a lesser number of reports and higher quality reports at the same time.

Behind the Quizzes heading of myCourses, the course management system offers a very powerful test bank

Test Bank and Quizzes

Figure 3

(Figure 3). I spent numerous hours entering multiple-choice and essay questions via the browser window. From there, I used the random feature to create self-quizzes and make them available to students. Students were encouraged to take no-credit bearing quizzes to test their understanding of the subject. Many of these quiz items would show up in a credit-bearing tests with test items also randomized so that no two students receive identical tests.

Ways To Enhance Learning and Interpersonal Relationship

In addition to teaching presence, Garrison, et al (2001) also defines "cognitive presence" and "social presence" as criteria for assessing educational values. To me, "cognitive presence" suggests "Things learned" or "I got it!" "Social presence" implies "there is a sense of belonging" or "the opportunity to compare notes" or "I made a difference in my team."

I have taught Tone and Color Analysis, a required graduate-level course, online since 1999. Teaching presence is evident in terms of various media mixes that help build understanding. Social presence is evident in discussion postings both in quality and in quantity. An interesting point is that social presence is based on the concept of "anyplace, anytime." It has given me the freedom to travel to attend conferences without missing my classes.

Cognitive presence is evident from quizzes, tests, lab reports, and teaching surveys. To enhance cognitive presence, it is strategic that I encourage students to ask questions and solicit their responses to open threaded discussion topics. We often made the "Heavy Hitter" list, a faculty recognition program from RIT Online Learning for being a high-volume user of myCourses.

By means of survey of students' opinions regarding online learning, I discover that: (a) there is a correlation between students who asked good questions and their grades (good questions were content-related, [e.g., can you elaborate more on the concept such and such], and not logistic-related, [e.g., when is the test scheduled, there is a problem with the streaming video]); (b) there is a correlation between students who put effort in lab report documentation and their grades (students learn the course materials best when they understand

by doing and not by memorization); and (c) there is a correlation between students who put effort in lab work and high ratings they gave regarding the quality of the course.

Blended Learning

RIT has 1,400 full-time and adjunct faculty members to support 92 undergraduate degrees, 70 graduate degrees, and four doctorate programs with an enrollment of 16,000 students. In the 2005-2006 academic year, 19% of RIT faculty (full-time and adjunct) taught at least one online course. Majority of courses are campus courses are not using the online course management system.

"Blended learning" is about using the online course management system on-campus. RIT envisioned considerable potential in creating educational value and began its blended learning efforts in 2003. One hundred and twenty-four (124) RIT faculty members have taught at least one blended course as part of the blended learning pilot or project since fall 2003.

In winter quarter 2008, 55% of RIT faculty used one or more features of myCourses, e.g., Grades, Content, and/or Discussion. A survey of these faculty members on blended learning was conducted in the spring of 2008. Below are major findings (Starenko, 2008):

1. Regarding faculty satisfaction with blended learning, 46% are very satisfied, 43% are satisfied, 7% are neutral, and 4% are dissatisfied. When asked, "Do you plan to continue blended learning," 72% responded with "Definitely yes."

2. Regarding motivation for blended learning, 68% cited flexibility as a motivator; 75% cited the opportunity to use new technology is a motivator; and 96% cited the opportunity for new pedagogy. In particular, the use of threaded discussion has shown significant impact on collaborative learning as well as on the performance of shy or reticent students.

3. Regarding student satisfaction with blended learning, 75% of the respondents indicate that students are very satisfied or satisfied. Students who are dissatisfied with blended learning cited "lack of faculty contact" and "less interaction online" as major causes.

I have attended a number of workshops on blended learning. It gave me an opportunity to hear how other faculty members described their experiences. The above-mentioned survey further solidified blended learning experiences at RIT as a whole.

Teaching On-Campus Students

I taught Tone and Color Analysis on campus and online in the School of Print Media. When RIT Online Learning started to promote the use of online course management system on campus in 2003, I jumped in without hesitation.

Having instructional materials converted to digital media is not a requirement in blended learning. Since I have the resources from teaching the course online, I make streamed lectures, lecture outlines, and quizzes available to my campus students. Students have the option to preview or review videotaped lectures at their own pace. I often administered an unannounced quiz at the beginning of a class to test their understanding of previous lecture and to enforce the importance of being punctual in class attendance.

While threaded discussion and private group discussion are very important for online students, this is not the case for on-campus students. Only a small portion of campus students would use the discussion feature in myCourses mostly because I placed a small bonus (5% of the total score) to reward their efforts. The majority of the campus students would not bother with online discussion. I suspect that campus students have the benefit of

Campus Students Working In The Color Management System Lab

Figure 4

meeting with the instructor face-to-face for questions and answers. They also prefer direct communication to reach his/her group for team projects in the lab (Figure 4). Using online technology to create group dynamics and collaboration with on-campus students successfully is not happening in my teaching.

Conclusions

Tools and materials used in the traditional classroom are tables, chairs, blackboard, chalk, slide projector, data projector, and so on. Tools and materials used in online teaching are computer, the Internet, and digital data. The difference between traditional classroom and online classroom is as drastic as the difference between using a map and a GPS for driving directions.

The acceptance of new technologies and services often follows a pattern. The technology adoption pattern has a typical bell-shaped distribution (Rogers, 1995). The first group, known as innovators, accounts for 2.5% of the population, and embraces new technology. The next group, early adopters, accounts for 13.5% of the population, and is followed by the early majority (34%), late majority (34%), and laggards (16%). The recent survey at RIT indicates that 19% of RIT full-time and adjunct faculty taught at least one online course. It is reasonable to conclude that online teaching at RIT is between the early adopters and early majority stage.

Learning to teach online is like parenting, one has to embrace it head on by doing, asking questions, and taking notes in order to feel good about it at the end of the day. While innovators are prepared to put up with bugs and flaws in new technology, early adopters are less tolerant toward these flaws. I considered myself an early adopter of online technology. I like the structured approach to course management. While the technology has bugs and flaws, I keep reminding myself, "Life is great when technology works."

Online course management system offers text-based discussion and is effective in online learning where students are away from one another. Most campus students meet their classmates daily in class and lab. They do not utilize online discussion postings even there is a bonus offered. They prefer direct communication. Online course management systems offer other benefits, e.g., quizzes, videotaped lectures, to complement on-campus teaching.

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This is an edited article.

Information Security and Small Business

by Dr. Wm. Arthur Conklin, College of Technology, University of Houston

Introduction

Information security has made a lot of headlines lately. Between numerous data disclosures (Privacy Rights Clearinghouse, 2008) and the recent headlines detailing espionage (Grow, Epstein, & Tschang, 2008), one could argue that the elephant is in the room. Information technology has grown tremendously over the past couple of decades, with the rise of the Internet, the e-commerce phase, the dot-com period and bust, and now the seemingly on-line connectedness of everything. The growth of online activity has changed the business environment for all firms, big and small. With this new business environment comes a new set of risks, and new methods to protect assets from these risks. Over the past several decades, the information security industry has grown in concert with the IT industry and the threats to enterprise level information. The tools and techniques of information security industry have been developed in response to enterprise level threats (Shostack & Stewart, 2008). The information security industry has fueled the growth of tools and techniques in response to their own needs as well; specifically an industry desire to sell product that solves a specific problem. Given the size and breadth of large enterprise IT operations, the variety of security issues is large and there exists some form of market for a wide range of solutions. Yet there are significant differences in the operations and resources associated with small business when compared to large enterprises. Small businesses may have significant, for their size, IT needs, yet their information security needs may not mimic those of the larger enterprise.

This paper explores the application of information security techniques in a small business environment. Although defining small businesses can be difficult (Headd & Saade, 2008), for the purposes of this paper a small business is one with less than 500 employees. What is the correct approach to information security and what are reasonable controls in a small business environment? Does information security have to be as complex as some news articles and trade magazines make it out to be? The good news is that the answer to this is "no;" the bad news is that businesses still need to perform specific actions; they cannot ignore the issue.

This paper examines the information security problem from a resource based prioritization basis. In today's information-centric business environment, many businesses possess information stores that have significant value. The sources of the information include customers, suppliers and the business itself, with most businesses having some combination of sources. Because this information has value, there are risks to these information stores, and it is against these risks that information security measures are designed to function. One of the primary tenets of information security theory is that controls should be used commensurate with risk. It is neither possible—nor economical—to guard against all possible risks. The challenge is to determine which ones should be guarded against and what measures provide economical value to the business. Just as it doesn't make sense to protect a $20 asset with a $1000 security system, it doesn't make sense to apply all information security technologies in all cases. The challenge is in determining what the correct level of protection is for information, as it doesn't always carry a specific dollar value.

In a large enterprise, a centralized IT staff manages the IT function for the business. A subset of this staff is the IT security staff that oversees the use of information security controls. Some of these controls are designed to guard against specific IT risk factors. Some are more general in nature. Some of these controls are in response to regulatory requirements. Taken together, in a large enterprise, these controls can amount to a significant workload, but one that is necessary to protect the information assets of the business. This myriad of systems and controls and competing business factors makes information security efforts in a large enterprise an effort involving significant levels of complexity. In a small business, there may not even be a central IT staff; IT functions may be covered as ancillary duties by people with other responsibilities as well. This raises the question of what level of resources are available for information security functions. Fortunately, in small business environments, the levels of complexity are typically much lower, making this problem more manageable.

To examine the issue of what is the correct set of controls, this paper takes the following form; first is an exam-

ination of the risks, second is an examination of small business specific risks, and then an examination of information security responses to these risks in a small business appropriate manner.

Information Security Risks

Information plays a critical role in many businesses and takes many forms; customer information, customer orders, financial information, supplier orders, and administrative information are but some of the many types of information. This information has value, both to the business and to other entities, and hence it is incumbent upon the business to protect this information that it holds. In a 2007 Town Hall meeting on Data Security at the RSA Conference, FTC Chairman Deborah Platt Majoras stated, "If companies collect information, then they need to be responsible for safeguarding it," adding that companies need to be aware of well-known and common security threats and protect against them (Majoras, 2007). She further qualified her remarks with items such as "The standard is not perfection, but reasonableness," "All organizations and the consumers we serve must contribute to creating and maintaining a culture of security for our sensitive personal information" and "[data security] can't be an afterthought anymore"(Majoras, 2007).

Information security can be described as the actions taken to ensure the confidentiality, integrity and availability of information (Conklin, White, Cothren, Williams, & Davis, 2004). Confidentiality refers to actions taken to ensure that information is safeguarded from disclosure to unauthorized persons. Integrity refers to actions to prevent unauthorized alterations to information. Availability refers to ensuring that information is available to authorized users when needed. We deal with these concepts every day in our lives with physical tangible items, extending these concepts to information is not that difficult. We are used to locking doors to keep unauthorized people out, yet giving keys to those we want to allow in. We are used to using original documents to ensure changes have not been made, and we all have dealt with replacing an item that is lost. Failing to take basic precautions may or may not have an immediate direct impact, but over time a reasonable person knows that failing to prepare for losses is little consolation once one occurs.

In the information realm, there are many threats to the information that one holds. Associated with each threat are the probability that the threat will occur and the damage that could result from the threat. There are several ways to categorize the numerous threats present in the business environment. One method is to list by probability of occurrence, another is by type of threat, or by type of control required to mitigate. This method requires significant expertise, specific information about each threat and its impact on the business, and can be a constantly evolving exercise as the business changes. This can be a significant amount of work. Threats can also be classified in terms of which aspect of information security they impact; confidentiality, integrity or availability. For the small business environment, the resource constraint implies that simple is the prevailing rule. This simple classification of risks is much easier and can provide sufficient information to develop controls in a small business environment. A list of common information security threats is presented in the box below.

Small Business Challenges

Common Information Security Threats

Data loss from hardware failure

**Data loss from accidental deletion,
human error (data no longer available)**

Data loss through theft (thieves, competitors)

**Data misuse by insiders
(available to unauthorized users)**

Data alteration, either accidental or deliberate

System Interference (spam, viruses)

Natural Disasters

Man-made disasters (backhoe interrupting services)

As previously mentioned, small businesses have fewer resources than those associated with a large enterprise. Fewer resources do not mean that ancillary business functions can be ignored or neglected. In the case of a small print shop, focused on high quality output with a penchant for customer focus, items such as accounting, marketing, and tax withholding, although ancillary, still

have to be done. What happens is these issues are also scaled with the size of the business, and end up being performed as a secondary duty by people in the business. This same approach will work for information security. Just as the IT function may be a secondary duty, so can be the information security function. Managing the workload of the ancillary functions through secondary assignment does not indicate they are not important, merely that in the business they do not require a full time employee to accomplish.

Applying the concept of simplicity to information security in the small business environment leads to useful conclusions. Small businesses tend to have smaller data quantities, smaller number of users, smaller number of machines, servers, and so on. Small has an advantage, for many information security issues do not scale well with respect for size. Maintaining a small number of machines, operating a small number of applications designed for a small business is something that a person can get their arms around, understand, and manage. In a large enterprise, the vast number of applications, machines, functions—many times with several sets of competing purposes—makes even understanding the scope of the problem nearly impossible. Their small size makes many things possible for small businesses and information security is just another area where small size can act in an advantageous manner.

Using the concepts of confidentiality, integrity and availability as a simple model, a wide range of risks can be managed with a relatively small set of actions. For example, the loss of information from any cause (such as server failure, disaster, and fire.) can be mitigated through a backup function. Rather than worrying about all the ways a business can lose data (hard drive failure, accidental deletion, etc.) it is more productive to build a good backup solution so that when data is lost, it can be retrieved. Using this same simple concept of focusing on outcomes, an examination of the issue of protecting data from accidental disclosure brings up the concept of permissions. Applying access controls to all resources ensures that only authorized users have access. Again, the small scale factor of a small business acts in favor of security in this instance. Using permissions allows management to control who has access to specific information elements associated with the business. Maintaining permissions across an enterprise with ten users is significantly easier than one with thousands of users. Just as it would be

unthinkable to allow everyone in the company access to the payroll information, it should be unthinkable to allow everyone access to all the company's data. Separation of duties works in payroll, and in keeping information resources secure. Separation of duties is a powerful management tool that is as important in protecting data as it is payroll and other finances.

To manage the issue of access control, users need assigned user IDs and some manner of identification. The easiest to manage and use are passwords. Although there are a lot of debates over the strength and viability of password protections, for the vast majority of uses passwords are fine and adequate. Passwords act much like locks; they keep honest people honest. Just as a locksmith can pick a lock, there are security experts who can work their way past passwords. The objective isn't perfect security; the cost of perfection is way too high, if attainable at all. The objective is to apply and maintain a reasonable measure of security. Again, the scale of small business works in its favor again; small numbers of user IDs and passwords are easier to manage than large numbers of user IDs and passwords.

One of the objectives of the information security aspect of any business is to apply the appropriate protections to the information under the control of the business. This is a broad statement and one whose difficulty increases with the size of the business. However, small businesses can reap the benefit of their small data footprint. Before a business can protect information, it must know and understand what information it possesses, and what specific levels of protection are needed for each element. The identification of data elements that need protection is a challenge for all firms. What makes it a challenge is the fact that the domain knowledge needed to understand the value of information elements typically rests with the operational business management, not the IT staff. For a small business, there is a double benefit associated with the small size and assignment of IT responsibilities to regular business personnel. These functions, IT and business process, are aligned, creating a synergy benefitting the small business. Having people that run the business become accountable for the information that helps them run the business can move the critical decisions closer to the point of impact, enabling both the understanding and implementation of appropriate controls. The objective is not to make the business people information security experts, but rather to apply a simple methodology to a simple problem. This methodology is as follows:

1. determine what information is important to the business;

2. decide what level of security is needed for each element;
   ◆ Who needs access to the information?
   ◆ Where will it be stored?
   ◆ How should it be protected?

3. and, apply appropriate controls to achieve objectives.

Again, the simplicity of the confidentiality, integrity and availability model allows us to group the results into logical groups. Just as a backup process and methodology can cover multiple data elements, so can other security processes. The process of determining how to protect business information while it is stored and used can be performed in large groups rather than element by element. The common method used to protect data from unauthorized access is a combination of access control and encryption. Access control is implemented by assigning permissions to data via controls in the operating system. Encryption is used to protect data when it leaves the confines of the network of the business. Whether it is on a laptop, or a backup tape, encryption protects the data from unauthorized release should the laptop or backup tape be lost. Again, this can be done via the operating system, so the tools needed are already possessed by most businesses. Advances in encryption technology make this as simple as checking a box when performing backups or setting up laptops.

An analysis of recent data disclosures illustrates a common weakness among numerous businesses, the retention of unnecessary data. Some data is needed for business purposes only for a limited time. For instance, in the processing of a credit card order, the credit card number, expiration date, validation code (3 digit code on back of card called a CVV code), and transaction authorization code are common data elements. To create the transaction with the card processor, the merchant needs to present several elements of information including amount being billed, the card number, expiration date, the CVV code, the card holder name and usually phone number or address. If successful, an authorization code is returned, if declined a rejection code is returned. After receiving the authorization or rejection code, the merchant has no need to keep some of the information, and is actually prohibited. Items such as the CVV code are not needed after the transaction and are not to be stored by the merchant. The idea is simple —this information is no longer needed by the merchant, and saving it can only lead to a chance of unauthorized disclosure. The solution is to destroy information that is no longer needed or relevant. This principle is a sound one that can be used in other places. When you have an employee leave the organization, disable their access so that they cannot access what they were previously authorized to use. Just like you would ask for the keys to the front door back, you should ensure electronic access is also revoked. Again, tracking this in a small enterprise is not as difficult as a large one, and having the IT duties performed by operational business people with specific knowledge of the daily happenings eliminates the issue of the right hand not knowing what the left hand is doing. This is common in large enterprises where the HR function is completely separate from the IT function and there are layers of management to communicate across. When an employee leaves a small firm, it is much easier to keep track of whether or not their permissions have been revoked.

As in the case of credit card regulations, in today's business environment, rules and regulations add constraints to how a business operates. The same is true in the information side of a business. Certain pieces of information may be required to be protected in certain fashions by government or contractual regulations. Employee health information, which may be mandated to be collected by the Occupational Health and Safety Administration (OSHA) for one purpose, may be regulated with regards to data security through regulations associated with the Health Insurance Portability Accountability Act (HIPAA). Financial information may be covered by regulations as well as inventory data. Government regulations affect many business processes and in many cases have information elements to their regulation. Again, the small size of the personnel resource pool means that the person responsible for the regulation compliance in the business is frequently able to directly influence the information security component as well, reducing the chance of error or misalignment of information action and operational actions. Understanding the regulatory regulations leads to correct operational procedures including information security behavior.

A common tool in the information security toolbox is one of knowledge and awareness, and this tool is typically employed through employee training. Training and

awareness is an essential element for success in any venture and information security is no exception. As in most grand statements, the devil is in the details. The objective of training and awareness programs is to influence a person's behavior at a critical point in some process. This makes the material context sensitive and process dependent. If we want cashiers to check $100 bills to see if they are counterfeit, we don't need to teach cashiers about counterfeiting, we need to teach them how to recognize genuine vs. counterfeit bills. And this lesson needs to become part of the standard work process. Just as a Wal-Mart cash register asks a cashier to check ID for age for certain items, we need ways to remind employees of information security specific checkpoints in their everyday tasks. Unfortunately, our systems are not built for such interactions, and even if they were, what would prevent the mindless "hit the OK button response"? Again, the scale of small businesses can work to an advantage. Engaging the members of the business as a team, involving them in the success of the business is easier and this makes connecting awareness and actions a more achievable task.

The challenge in connecting information security and awareness and actions is one of timing. Holding an annual hour long training session does not help over time; people will act in manners governed by habits. What needs to happen is a series of timely reminders that bring the message home in real terms—for instance, a discussion at lunch over how a data breach could hurt the firm, even kill it, will help remind people of their valued role in maintaining the security of the information entrusted to the firm. Having refresher sessions and a variety of means of disseminating information will help. Even the warning banners that we routinely click past will have some small effect, and the goal is to have cumulative behavior change. Aligning worker behaviors with company information security practices is a continual battle, balancing worker freedom to act in their own fashion and the desired business objectives of the small firm. Again, size matters, for in a small business, a workgroup team can be the whole business or a substantial part of it.

Summary

Information has become a driving element in many of today's businesses, and modern information technology has enabled small businesses to do more work with fewer resources, making them legitimate players in today's diversified marketplace. This information has value, and markets exist for this information, including criminal markets for stolen information. It is incumbent upon businesses to protect their information resources like they would any other business asset. Examining the challenges using the case of a small graphics printing business, we can examine the daily information flows and how they could be protected.

Before an order even comes in, we have some information sources that we should protect. We would probably not want to publish our customer list, contact names, and the prices we charge for the public to view. Likewise, we should know where that information is in our IT systems and ensure we have placed some form of protection against loss or compromise. Backups come to mind, as does a control list restricting access to company employees with a need to know. Opening our email, we discover an email asking for a quote on a job. How is our email protected from spam, compromise, and loss? The simple answer for most small businesses is to outsource email to a local provider. This is more cost effective and much simpler to manage. A second layer of protection is antivirus/anti spyware protection on all of our machines for anything that does come across in an email. Another path for information to enter our systems is via a website, with forms that allow customers to upload print jobs and orders. When we have these built, we need to specifically inquire about the security provisions, and copy the simple methods used by people like banks, Paypal and Amazon; use SSL (https:) and let the technology manage some of your security issues. These are "build once" and "get it right the first time" options that do not increase costs significantly, but make a difference on all subsequent transactions.

Once the order is in house, how sensitive is the data? Is it a PR piece that wide distribution would only be good news for the client, or is it sensitive—like financial reports—that must be kept secret until a specific date and time? The sensitivity of each job has to be determined as it comes in, but having the correct IT locations for storing them is a business decision that occurs once ahead of time. Should we protect all jobs the same, or keep some in special places? This is a question that each firm needs to address, but it is a one-time, up front decision that then enables correct protections after the fact. This addresses the issue of where sensitive data is stored. How is access controlled (access control lists), how is it backed up, and

does it ever leave the company's infrastructure? If the information will make its way onto a laptop—how will it be protected if the laptop is stolen? Encryption technologies solve these questions, but where and how it is applied is another one of those decide once and then use forever decision that has little downstream impact. Whole disk encryption for laptops is easy with many products today, as are network based backup solutions.

The simple answer for small business is whenever you encounter information, think about it—how important is it to the firm, what does it need to be protected from: loss, disclosure, nothing? And, based on these answers, the correct paths become obvious. If the business has already implemented the solutions, using them is easy. Getting all employees to look at it this way, with periodic reminders to keep everyone fresh makes this very doable. There are three simple questions:

1. Is the information important to keep?
    This is *availability*; if the answer is "yes," then back it up.

2. Do I need to keep this information away from unauthorized people?
    This is *confidentiality*; if the answer is "yes," then store it in a protected place with access controls.

3. Is the content of the information specifically important?
    This is *integrity*; if the answer is "yes," then back it up and control access. Audit logs can tell who changed what and when.

These questions form the basis of the information awareness aspect of the business and are important for everyone to understand and use. One additional question for management is to decide when the information is not needed anymore and how to ensure it is properly destroyed. Keeping old information around can only aggravate a loss if it does happen. The challenge is deciding when it can be destroyed, hence why this question is reserved for management.
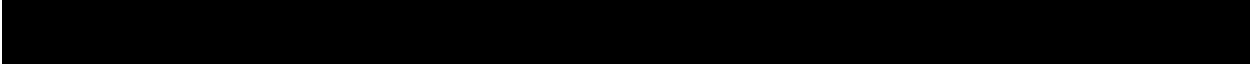
The business then only needs to provide some simple solutions to enable employees to do the right thing with information. A firewall and access control mechanism will keep unauthorized people out while letting the authorized people in to the network. A backup solution is needed to keep information safe from harm, and loss. This backup needs to be stored at a separate location to protect from physical loss to problems like fire and disasters. Built-in encryption technologies for web pages with sensitive data entry, and for laptops, will protect important information when in transit and outside the company.

Information security need not be complex or difficult. In a simple place it can be simple. Just as your front door lock is simpler than a bank's, so can your information security measures. Just becoming aware and applying these simple measures will make your firm much less of a target and head off many potential problems. Thieves steal from victims that make it easy and where the risk to the thief is low, so putting in place simple controls will send many criminals in search of an easier mark. Nothing stops a tornado from tearing up the building it hits, but a good offsite backup means that the business can continue in a new building with minimal disruptions. And as a closing thought, these same principles will apply easily in the home environment for most people, so when thinking security in a proper simple manner, the results become easy to achieve.

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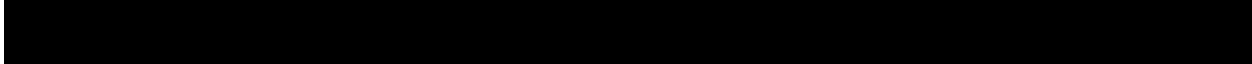
Factors for Success in Entering the Print Industry in China

by Mr. Richard Dooley, Kean University

Introduction

United States-based printing companies have begun to establish presences in China to provide printing and imaging/print management services to their large corporate clients that have manufacturing facilities located abroad. One company, Diversified Global Graphics Group (DG3), established its printing presence in the finance industry in Hong Kong and, within ten years, its workforce jumped from four to 120 employees. R. R. Donnelley invested in and built printing operations in Shenzhen and Shanghai. Toppan Printing Co. Ltd., Japan has invested over $90 million U.S. to set up a large-scale packaging, printing, and ink manufacturing enterprises in Shanghai with its Chinese partners. Now, smaller printing companies in the U.S. are attempting to follow this trend. Many printing companies in the U.S. are "crunching the numbers" to determine if opening print operations in China is the right business move for them. Some key factors to be considered include: How to work in compliance with China's business rules and practices; cultural differences; the time difference; quality control issues; the language barrier; rising fuel costs; intellectual property protection, and safety/environmental issues.

The Current Print Industry In China

The Chinese printing industry is one area that has been identified as having some of the greatest potential to grow rapidly in the next decade, and U.S. printers have begun to explore that potential. Sectors of the economy that utilize a wide variety of printed materials include automotive, fast food, brand name consumer products, investment banking and other financial services, technologies, telecommunications, and pharmaceuticals. It is in service to—and in response tothe demands from these sectors that U.S. firms have been prompted to relocate their printing operations to China, and many of these U.S. printing companies are experiencing great success. As more and more U.S.-based printers open subsidiaries in China, they are attracting the attention of many other printers.

In response to the increased interest on the part of U.S. printing concerns seeking to establish operations on Chinese soil, the Chinese government has continued to enact laws, policies, and regulations for its printing industry. In 2001, The Press and Publication Administration China (PPA) implemented a number of policies and regulations, including *Ownership of Printing Business, Setting Up Foreign Invested Printing Enterprise, Regulations on Accepting and Producing Printed Products,* and *Guidelines on Annual Inspection and Ratification of Printing Enterprises.* The policies and regulations put in place through the efforts of the PPA have opened the door to U.S. development and investment in China's printing industry.

China's printing industry is largely based in the Guangdong. This province has more than 15,000 printing firms, 900 of which have foreign funding. Guangdong's provincial government is exploring several initiatives to transform this Pearl River Delta region into a world-class, foreign-oriented center of printing. Recent initiatives include: allowing majority or even full foreign ownership of printing companies in this province; developing industrial parks for printing firms; and allowing tariff-free imports of raw and supplementary materials—including ink and paper products—from Hong Kong to lower production costs for Guangdong's printing industry.

China has already opened up markets and the printing industry to overseas investors, fulfilling commitments made upon its entry to the World Trade Organization (WTO) in 2001. Foreign capital in the publications sector is now mainly focused in the printing industry. The Chinese administration approved 202 foreign-funded printing companies in 2002, with a total investment of US $568 million. In 2003, another 84 foreign printing companies were approved, with an investment of US $469 million. Trade Agreements such as The US—China Joint Commission on Commerce and Trade (JCCT) was also an important factor for allowing the Chinese printing industry to grow, and it is growing by double digits annually. The JCCT was established in 1983 as a forum for high-level dialogue on bilateral trade issues. In 1994, as US—China commercial relations became increasingly complex, the two governments institutionally strengthened the JCCT by establishing structured working groups covering trade and investment issues, business develop-

ment and industrial cooperation, and commercial law, in addition to a side dialogue on export controls.

Foreign-funded enterprises have invested a total of 2.11 trillion U.S. dollars in China as of the end of 2007, up 23.5% year-on-year, according to the State Administration for Industry and Commerce (SAFIC) which is the authority in the People's Republic of China responsible for drafting and putting new legislation concerning the administration of industry and commerce.

The U.S. Looks Over The Wall

The U.S. printing industry is experiencing increased competition from China. Until recently, China's print quality, turnaround times, language/cultural issues, shipping costs and logistics all made submitting and managing overseas print work difficult. Now, there are technological factors and economic incentives reducing the obstacles that U.S. print buyers experience when sending work to be printed in China.

Many U.S. printing firms are looking to China to meet the demands of their customers who manufacture products in China but, because there are no China-based facilities to provide the printing/packaging components, must assemble the product and package in the U.S.

According to printing industry expert and author, Frank Romano, Professor Emeritus, Rochester Insitutute of Technology, "The U.S. manufacturing base is slowly dwindling. More than half of the manufactured goods that Americans buy are now made abroad, up from 31 percent in 1987. China has increased its U.S. print exports by 243.9% since 1996. That means that the tags, labels, boxes, instructions, and other packaging materials are produced overseas. It is the hidden volume of print that just disappeared from the American revenue stream."

Purpose

The purpose of this study was to identify key factors in the successful operation of U.S.-owned printing companies in China.

Method

1. **Information collection:** Information about printing companies with manufacturing operations located in China and the United States were collected from various resources, including the American Chamber of Commerce in the People's Republic of China (AmCham-China), NAPL, and <u>whattheythink.com</u>.

2. **Questionnaires:** A 15-question survey was sent to leaders in the print industry: companies currently doing business in China, printers, and academics with expertise in the global print markets.

3. **Telephone interviews:** Follow-up telephone interviews were conducted with some of the survey respondents in order to get more accurate and complete information.

4. **Analysis:** An analysis of the data from all of the methods outlined above was used to identify if opening print operations in China is a beneficial endevour.

Questionnaire Data:

Fifteen questions about key factors involved in establishing printing operations in China were composed from information gathered from studies done on global marketing and offshore printing. The design of the questions was open ended to allow respondents to provide reaction statements or opinions about the research topic.

This section includes the questions, selected comments from the respondents, and brief analysis of the comments.

1. **What factors influenced your decision to open a printing plant in China?**

"Our biggest customer said we had to have a presence in China or risk losing their business." This telling response summed it up for most of the respondents. The greatest factor motivating U.S. printing firms to open a plant in China was economic necessity. To remain competitive, U.S. printing companies with large corporate clients have been under increasing market pressure to establish presences in China. Furthermore, the driving force is the undisputable fact that production costs are substantially lower for offshore printing plants in terms of labor as well as paper, and those savings are passed along to the customer.

This is the main impetus driving print work overseas, the substantial cost savings offered by offshore printing. Print buyers and others seem to agree that if a project is

practical to produce offshore, companies are able to achieve average price savings of 30% to 40%, including shipping charges.

The offshore printers we spoke to said virtually all of their savings are achieved through the far lower cost of labor in overseas countries. This means that, depending on how labor intensive a job is and how much savings are achieved using lower-cost papers, offshore production costs are actually 50% to 60% lower than U.S. costs, not including shipping (Webb et al, 2005).

2. **Does working within the parameters of China's rules and practices present any challenges?**

"Finding the right partner in anything is always the key to any degree of success." Printers who were successful in establishing operations in China were the ones who were fortunate to have acquired excellent partners in China, professionals familiar with all the specifics of China's rules and practices for the printing industry.

Interviews with managers show that a critical factor for the success of joint ventures in China is to find a local partner that is capable, well-connected, willing to cooperate, and shares the same objectives as the foreign partner. In the absence of these qualifications, it is quite likely that the joint ventures will encounter serious problems. (Yang, 1998)

China's complex social, political, and cultural structure, predicated on the strength of personal relationships, demands a sophisticated and subtle approach to business dealings. The importance of finding the right partner(s) to negotiate with local Chinese government officials, as well as manage on-site day-to-day printing operations, cannot be overemphasized. All of the respondents—printers as well as industry leaders and experts—were emphatic about the need for a knowledgeable, trustworthy overseas partner to ensure the success of any business venture in China.

3. **How long did it take to get your company established in China?**

While most experts stress the importance of patience and perseverance when conducting business in China, most of the printers stated that it took them less than one year to establish a printing operation in China. This

response is attributable to the fact that the respondents had access to the kinds of financial and human resources needed to effectively address all of the various issues involved.

4. **Do cultural differences have any impact on your business? How are they addressed?**

"Dealing with any culture means a difference in the way you act in terms of speed, aggressiveness and style. We try to take our cues from our people in the areas and advice from others who have been there." Cultural issues and misunderstandings can have profound practical and philosophical implications that may impact a company's ability to conduct business in China. Awareness of cultural norms plus sensitivity to the differences is absolutely vital to developing a successful offshore operation. Ignoring or disregarding the importance of cultural differences can spell disaster for a would-be business owner in China. Taking the time to learn, understand and work with local customs and manners, along with an openness to suggestions from more experienced professionals in the field, can result in positive and profitable outcomes for employer, employees, and clients.

5. **Is the time difference a factor?**

Not really. Our people communicate mostly by e-mail, and our customer service representatives are on-call an average of 10 to 17 hours per business day.

While communication lags have been an issue in the past, all of our respondents said that the time zone difference was not a factor in how efficiently they were able to conduct business.

6. **Do you find the quality of China's printing to be as good as, equal to or exceeding that of the U.S.?**

All printers interviewed for the report said Chinese based printers exhibit print quality levels that are comparable to U.S. print vendors.

Chinese printers have increased quality over the past few years, through the combined adoption of press-calibrated digital proofers and computer-to-plate devices. PDF workflows make job submission and management easier. Chinese printers are doing more commercial work in runs up to 10,000 pieces and shipping jobs via air

freight to reduce turnarounds. Foreign printers are providing U.S. clients average price savings from 30% to 50% (including shipping), principally derived from lower labor costs. Chinese printers are offering graphic design services as well (Webb, 2005).

According to Ron Ellis, a prepress consultant specializing in workflow training and integration, "One of the biggest myths about printing in China is the belief that Chinese and other foreign printers produce a lower quality product. More often than not I heard the following statement from print buyers: 'The quality we get from China is actually better than the quality we get in the U.S.'" (Ellis, 2008)

7. **Are your customers exclusively U.S. companies?**

All respondents indicated that their customers were primarily multi-nationals.

8. **Has the U.S. government assisted your business in any way?**

The Environmental Protection Agency (EPA) is collaborating with organizations that have expertise in Chinese environmental law and in environmental issues faced by U.S. entities in China. Department of Labor/OSHA was also helpful to some respondents in terms of safety issues for workers.

9. **What percentage of your workforce is Chinese?**

More than 50% of all employees are Chinese.

"We have separate companies in each country. Worldwide we employ about 75 workers; about 45 of them are Chinese." The cost of labor in China is dramatically lower than in the U.S., so it makes economic sense to have a high percentage of Chinese employees, though the printing industry requires a skilled, educated workforce. In China, the constant growth of the printing industry is demanding better education. Right now, there are 12 universities and institutes that offer graphic arts related programs, with nearly 16,000 full-time students registered in the undergraduate and associate programs, and more than 380 full-time students registered in postgraduate programs, (Japan Association of Graphic Arts Technology).

10. **Are U.S. publishers or print media companies exploring the possibility of establishing printing operations in China?**

"Printing [of books, newspapers, magazines] is a protected area in China because it transmits information. It is not easy for anyone to get the necessary licenses to get started. The Communist Chinese government imposes a strict licensing scheme on the print media. No one may legally publish a book, newspaper, or magazine in China unless they have a license from the General Administration of Press and Publication (GAPP). Chinese law requires that every book, newspaper, and magazine have a unique serial number, and the GAPP maintains exclusive control over the distribution of these numbers. GAPP officials have explicitly linked the allotment of book numbers to the political orientation of publishers. The Chinese government's licensing scheme includes substantive conditions on who may publish. To obtain a license to publish news, applicants must have a government sponsor (Congressional-Executive Commission on China, 2006).

11. **Are there any language barrier issues?**

All respondents indicated problems in this area.

Suggestions were made both to communicate via e-mail, thereby reducing the potential for verbal misunderstandings, and to train both English speaking and Chinese speaking employees to understand at least the basics of the other's language. Also, employing managers and customer service representatives who are fluent in both English and Chinese can help insure that client/vendor communications are clear and accurate.

12. **Have rising fuel costs affected your business in China?**

This question elicited a resounding **yes** from all respondents.

13. **Are intellectual properties protection and enforcement an issue?**

None of the responses indicated any issues with this. Copyright infringement remains a large issue elsewhere

in China and in connection with the heavily regulated Chinese publishing industry.

14. **Did you or are you currently considering any other countries in which to open another plant?**

One respondent indicated that the operational ideal would be to have pre-press work handled in India and printed materials produced in China. India has a large pool of well-educated and technologically literate workers and China has a surplus of skilled printers.

15. **Knowing what you know now, is there anything you would have done differently?**

According to the respondents, only minor things, a response attributable to the fact that these were printers already conducting successful businesses in China.

Conclusion

This study attempts to identify some of the critical success factors for U.S. printing firms looking to conduct business in China. Based on a questionnaire, interviews, and information, the following factors were found to be among those considered crucial to success: finding the right local partner to help navigate the intricate network of business regulations and to negotiate with Chinese government officials; being aware of and sensitive to cultural differences and working with on-site professionals to address those issues; hiring a substantial percentage of Chinese workers to take advantage of lower labor costs; and taking steps to overcome difficulties associated with the language barrier.

Given the complex investment environment in China and the political, economic, and social transformations in the Chinese society, it is quite difficult to come up with one single model to explain the success of U.S. printing firms in China. The intricacies of China's environment, the thousands of years of Chinese culture and tradition, the differences in industry growth rates and the on-going economic reforms in China have made it difficult for printing firms to utilize a single strategy to facilitate success in China. None of the interview results indicated a ready formula that can be imitated by other firms. Success seems to be more closely connected to and dependent upon the development of relationships and trust between a company and its local partner in China than on any

other one factor. U.S. companies aiming to explore acquisition or alliance opportunities in the emerging Chinese print industry need to understand, cultivate, and utilize these relationships. In China, there is a saying: "If you have a relationship, you have a road." Chinese government and business structures often lack transparency, making it difficult to clearly understand the situation or the players involved—hence, the indispensability of recruiting the right local partner in establishing a successful business presence in China.

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Ever since China entered the WTO, the investment of overseas capital into the Chinese printing industry has been greatly accelerated. After China's accession to the WTO, the government approved 170 printing enterprises with foreign investments in 2002 and 2003. Those investments exceeded U.S. $1 billion. In 2004, the country had 2,200 foreign invested printing enterprises; most of them are located at the coastal line areas, about 1,600 in Guangdong Province (in which 90% are investments from Hong Kong), and 200 in Shanghai.

Foreign Investment Printing Enterprises

Figure 1

From Gutenberg to Juan Doe: The Dulling of Quills, The Inking of Fingers, and the Bluing of Collars

by Mr. Ken Macro, California Polytechnic State University

Print as the Impetus to Societal Change—a Historical Perspective

The graphic communication industry has experienced a vast amount of change over the past 500 years. Since Johann Gutenberg's invention of moveable type made of lead, tin, and antimony, to the introduction of Steve Job's Apple Computer, technology has ultimately been the guiding force for which this industry has progressed. Most importantly, the people who have worked in this industry have inevitably felt this change. Whether through the loss of jobs, inadequate training, attrition, or lack of interest and/or insight on behalf of the work force, the advent of technology has generated significant change, not just in terms of economics or finance, but on a socio-cultural plane that sets apart the classes associated with the working environment, i.e. the white-collar and blue-collar workforces.

Measuring changes that have occurred within the graphic communication industry can be expansive, complex, and stagnating. Technology, albeit, has affected every business entity in the world. Moreover, the printing business, or craft as it was once recognized, required skilled artisans and craftsmen to produce the printed word that became the cherished information appropriately disseminated among the masses of individuals within a given community. Generally this occurred in the form of a book, or flier, poster, or writ. Because of the value placed on this information, the printery was well respected—as were the employees who assisted in producing the end products. Over hundreds of years and the evolution of offset lithography, printing has become less expensive and faster. Technology alone has moved this craft-based industry into a highly profitable volume-producing commodity. As production speeds have increased, output volumes inevitably have became larger, and, as a result, the demands upon the workforce have become greater thus prompting significant growth in the labor force. The ironic turn of events associated with technology is that it constantly improves. Newer technology consistently replaces older technology. Because of the advances made in the field of Computer Integrated Manufacturing (CIM) and automation, printing equipment—once requiring a three-person crew—now only requires a single person. Additionally, with such rapid changeover regarding technology placement, much knowledge (both tacit and explicit) is lost resulting in a poorly informed, minimally trained workforce.

As equipment became more and more automated in the 1980's and production volumes increased ten-fold, business and corporations starting purchasing and installing even more technology. While management became entranced on focusing on the bottom-line and increasing production yields, the blue-collar workforce fell to become a second and often third priority with regards to training and advancement. New technologically advanced equipment requires comprehensive and expensive training. As a result, more white-collar personnel and middle-management became trained in the operation of the equipment. However, lacking daily operation experience, this "trained" workforce still required the daily production equipment operators to assist them. Many businesses were unable to realize the increase in profits or efficiencies because of the communication gap that existed between the two forces.

Additionally, as the printing press was becoming retrofitted with computer interfaces and remote diagnostic devices, and e-mail transactions became the protocol for interdeartmental communication, press operators were forced to write reports, memorandums, and maintenance logs (among other items) electronically. Confused by the overall sophistication of the automation placed on their printing equipment, compounded with their inexperience or lack of ability to communicate through writing composition, the force has become disenfranchised, disengaged, and fearful of employment termination.

How can five hundred years of technological innovation in an industry founded on the skills of a rhetorician-craftsman-artist-editor have evolved into a class system comprised of blue-collar workers who, through the impetus of technology, are inadequately prepared to communicate discourse through electronic written media? The primary objective of this forum is to explore modern social theories that focus upon societal change, most specifically, as it relates to technology. Works from theorists such as Birkerts, Blumer, Ferre, Patterson, Rubin,

Steward, and Veben will be analyzed, contrasted and compared and then integrated with historical perspectives that focus upon the printing revolution based on theories from Burke, Deacon, Eisenstein, Fevre and Martin, McKenzie, McLuhan, and Ong. Each writer has explored the significance of change as a contributor to our multicultural society. Through analysis and comparison of each of these writings, it anticipated that a cathartic synthesis will emerge exposing the underlying foundation for furthering exploration in improving and/ or addressing training initiatives as they relate to technology and the blue-collar printing production workforce—a workforce that has removed the ink from their pens and onto their fingers as a direct result of capitalism. It is truly the bluing of collars.

The Printed Word—The Catalyst to Societal Change

> *The printing press laid the basis for both literal fundamentalism and for modern science. It remains indispensable for humanistic scholarship. It is still responsible for our museum-without-walls.*
> *—Elizabeth Eisenstein (1976b, p. 704, para. 1)*

Martin Luther's Reformation from the Roman Catholic Church is synonymous with societal change. It was the public display and eventually reproduction of his 95 Theses that began such a radical movement. Bringing the information to the masses in a common language understood by that very community was paramount for the success of the reformation. Of course, had it not been for the printing press (and the ability to lock moveable type in a chase), Luther's 95 Theses would have been hand copied in the scriptorium of the local monastery and disseminated exclusively to clergy within the church. The local community would have most likely not been informed of his ideas, and if so, most likely through oral formulation. The printing press, however, provided an excellent means for mass producing Luther's writings in the vernacular; copies were handed out to crowds gathered in village squares. Because Luther wanted his writings to be understood by the common parishioners of the village, he authored his writ in German, thus resulting in the eventual fueling for the evolution of the Reformation.

In fact, Febvre and Martin (1976) credit Luther for the transcendence and modernization of the entire German language through his printed words. In their book *The Coming of The Book: The Impact of Printing 1450-1800,* Febvre and Martin (1976) wrote, "By encouraging the multiplication of the number of texts available in the vernacular the printing press everywhere favoured, as it had done in Germany, the development and systematisation of the language of the nation" (p. 323). The Reformation sparked a great movement in translation of sacred and secular works into common spoken languages as opposed to the traditional Latin translations generally incomprehensible to non-Latin-speaking commoners.

This movement, in and of itself, bred a whole new revolutionary set of issues never before witnessed by humankind. Disciplines and trades that were seemingly different and exclusively unrelated were instantaneously introduced to one another and forged into alliances that provided for a means in which to produce books. Thus, new and innovative skills became demanded of the basic and general printer; and not just craft-based skills, but intellectual, communicative, and variegated skills as well. A collaborative combination of occupational experience emerged within the printery, especially in university towns. Stationers, copyists, illustrators, ateliers, goldsmiths, leatherworkers, monks in scriptoria, clerks of the courts and chanceries, and clergy compiling sermons all found a very profound and deep interest in printing. According to Elizabeth Eisenstein (1979a), "The advent of printing led to the creation of a new kind of shop structure; to a regrouping which entailed closer contacts among diversely skilled workers and encouraged new forms of cross-cultural interchange" (p. 55).

Therefore, printers quickly emerged as prominent business entities within the aristocratic community. "In those places where his enterprise prospered and he achieved a position of influence with fellow townsmen," posited Eisenstein (1979a), "his workshop became a veritable cultural center attracting local literati and celebrated foreigners; providing both a meeting place and message center for an expanding cosmopolitan Commonwealth of learning" (p. 56).

As the printed book became increasingly more popular, there developed a greater need for the translation of existing classical secular and sacred works. In addition, without the existence of punctuation, grammar, or spelling guidelines, printed pieces began to look unorganized and, as a result, had tendencies to be misread or confus-

ing. Rules for punctuation, grammar, and spelling became prevalent as printers began to organize text and prepare it for printing. Much of this burden (or opportunity) fell to the printers. Febvre & Martin (1976) wrote, "Spelling long remained subject to the whims of foremen and compositors: authors might complain but they could not prevent it. Little by little, however, standards were fixed, not so much by a priori principles invented by innovating theoreticians as by the slow changing of habits" (p. 327).

Again, from this once craft-based trade blossoms the new aristocratic intellectual scholar-printer who has been given accord for developing the linguistic world that bridges the sacred with the secular, the aristocracy with the peasants, the foreigners with the natives, and God with the people.

No other noble English printer researched throughout history has been given such recognition for his contributions to printing, and, most importantly, the English language and literature than William Caxton (1422-1491). Caxton has been accredited with translating and printing the first book in the English language: *Recuyell of the Historyes of Troye* (Deacon, 1976). This particular piece was allegedly completed in 1471 and presented to Mary of Burgundy. Most particularly, Caxton is widely studied by literary scholars because of his enlightening and intrinsic inscriptions often placed at the beginning or end of his translations. At the end of Ruceyell of the Historyes of Troye, Caxton wrote (Deacon, 1976):

Thus end I this book, which I have translated after mine author, as nigh as God have given me cunning to whom he given the laud and praises. And for as much as in the writing of the same my pen is worn, mine hand weary and not steadfast, mine eye even dimmed with overmuch looking on white paper, and my courage not so prone and ready to labour as it hath been, and that age creepeth on me daily and feebleth al the body; and also because I have promised to divers gentlemen and to my friends to address them as hastily as I might this said book, therefore I have practiced and learned, at my great charge and expense, to ordain this said book in print, after the manner and form as you may here see; and it is not written with pen and ink as other books are, to the end that every man may have them at once. For all the books of this story named Recuyell of the Histories of Troy,

this imprinted as ye see here, were begun in one day, and also finished in one day. Which book I presented to my said redoubted lady as afore is said, and she hath well accepted it and largely rewarded me.
—(Deacon, 1976, p. 87, para. 3).

Deacon (1976) provides valuable insight into interpretations of Caxton's writing. Deacon points out that Caxton—in writing that the book was printed and bound in one day—is essentially Caxton's way of selling the printing press as a new and innovative method in which to quickly disseminate knowledge and information, making it available to the public within the confines of one day. This inscription is his lament for the newly born process known as printing. In addition, what this piece contributes to the mindset of Caxton, a trade printer, is the inherit value placed by him on mankind's ability to translate foreign literature into the native language of his own country of origin, England.

As the art of printing began to emerge all across Europe, more and more printers—predominately scholar linguists and purveyors of the written word—began to see the real assimilation between writers and readers. Deacon (1976) posited, "But as Caxton printed books so his critical faculties were stimulated and so he began to grasp that a dialogue between readers and printers, or readers and editor and translator, was essential" (p. 139). Because of this metamorphosis, printers began to take liberty in the modifying the rhetorical structures of texts that they began to print. They changed wording, they enhanced translations, they inscribed annotations, they added punctuation, they took simple combinations of words in which they added structure and meaning, and provided the foundation in which these words could be woven to form a literary experience for those who could read. They brought about an enhanced sense of civility to the culture in the form of codified expression. "Printing," wrote Febvre & Martin (1976), "thus helped to render the national languages increasingly sophisticated as modes of expression, and in the 16th century they established, on an unquestionable basis, their claim to be languages with an independent literature" (p. 328). Additionally, Eisenstein (1979b) asserted: "The communications shift altered the way Western Christians viewed their sacred book and the natural world. It made the words of God appear more multiform and His handiwork more uniform. The printing press laid the basis for both literal

fundamentalism and for modern science. It remains indispensable for humanistic scholarship. It is still responsible for our museum-without-walls" (p. 704). Hence, the evolution of printing is an ever-increasing and opportunistic commerce.

By the mid sixteenth century, the printer emerged as prominent player in the local aristocracy. Eisenstein (1979a) contended that the printer became a substantial figure within the community as a key liaison to many business centers. While managing money, supplies, production schedules and estimates, forecasting markets, and appeasing labor, "He had to keep on good terms with officials who provided protection and lucrative jobs, while cultivating and promoting talented authors and artists who might bring his firm profits or prestige" (Eisenstein, 1979a, p.56).

The manufacturing of print is the impetus to a movement of societal change like no other phenomenon experienced in the history of mankind. The printed word has contributed to the evolution of highly knowledgeable societies that have created and designed technologies that have advanced them beyond all imagination. The codification and dissemination of knowledge and thought—both physical and metaphysical—presented in the form of printed words (i.e. the book), has been the sole and preferred vehicle of knowledge transference for over 500 years. With this progression has yielded the evolution of the printer from craftsman and artisan to prominent aristocratic businessman and has seen an industry grow from a locally owned sole proprietorship community establishment to a multi-national billion dollar manufacturing industry. Of course, all of this progress has contributed to even more existential change illuminating the pathway for the evolving forces of print.

The Power of the Pen

Elizabeth Eisenstein (1979b) argued that the vast movement of change sparked by the invention of the printing press has continued to generate "additional momentum in the age of the computer print-out and the television guide" (p. 704). Her remarks are entirely true, for the print industry has grown exponentially just over the past 200 years. The overall success of printing as an industry, however, would not have transpired if it were not by the power of the written word. The act of writing encompasses the physical documentation of thoughts

through the expression of words in the form of sentences that convey meaning. Writing is the codification of mental stimulation, processes, and thoughts that can inspire, inform, and/or invoke change within the very soul of the one who reads it. Print is simply the vehicle in which to carry the words and the writing. Henri-Jean Martin (1994) wrote, "No invention has struck people's imagination quite as much as the invention of printing, nor has any been as glorified by its contemporaries, precisely because it involved things of the mind" (p. 227). Of course, writing, synonymous with the academy, requires an advanced level of intellectual processing, a skill that is learned and continuously honed. Therefore, those who possessed the skills to write, at least as seen in the eyes of those living in fourteenth century Europe, must be part of the social elite. "In the hands of the bourgeoisie," wrote Martin (1994), "whose emergence was connected with the use of writing, it was an instrument of power used to combat the aristocracy" (p. 22). It can be assumed then, that a significant number of the merchants who took to the art of printing could read and write—at least those who evolved to become prominent figures within their communities.

With the ability to write, and the ever increasing popularity of the book with respect to the public, printers assumed an even more advanced role within the hierarchical organization. Public writings associated with administrative proclamations, judiciary documentation, and financial recordings began to fill shelves at public archives and institutions. Such a movement exemplifies how the expanding uses of writing extended the systematic advancement of Western societies (Martin, 1994). With this newly found power, the printer became highly respected entity within the monarchies ruling their given territories. For with the printing press, and the skilled printer well versed in the skills of writing, the presiding governing body could enhance its power base by communicating to its constituency. Such communication could be conjured as such to be both manipulative and encouraging. Martin (1994) reported that a movement was started to standardize pronunciations stemming from different dialects of spoken French. In order to do this, marks were invented in order to instruct readers when and how to pronounce a given word. Martin (1994) wrote, "Since any standardization of the sort could be effected only with the aid of a printing press, it was essential to have the necessary characters cut and to persuade both the typographers and the public to change their

habits" (p. 500). Furthermore, this reform was fueled by humanist printers familiar with Latin and Latin grammar. They, as a result, became closely protected by the reigning king and soon became a favorable addition to the existing chancery and royal courts—a movement referred to by Martin (1994) as "monarchic centralism" (p. 500).

Print as the Impetus to Societal Change—a Modern Perspective

No other contemporary scholar's work has echoed the sentiments of the intrinsic importance of printing as a catalyst to social change than Marshall McLuhan's *The Gutenburg Galaxy: The Making of Typographic Man* (1962). McLuhan generates a very challenging, in-depth, highly-intellectualized, and compelling argument on the positive and negative ramifications of printing and the evolution of literary, communicative, and technological advances that have collaboratively yielded a modernized society. Although similar to Julian Steward and his theories regarding multilinear evolution and cultural ecology, McLuhan analyzes more closely the implications of printing technology as the major contributor to social change and modernized civilization. McLuhan (1962) argued that printing, in its earliest forms dating back to the seventh century China, was merely a way in which to codify and display spiritual ideographs en masse in order to visually direct a cultural following. "Print was an alternative to their prayer-wheels and was a visual means of multiplying incantatory spells, much like advertising in our age" (p. 34). His argument is that even though the content was not based on capitalistic gain, print was a method in which to manufacture a vehicle (paper and ink) that communicated a message repetitively. This would equate to contemporary marketing theory involving marketing saturation and the ability to embed content in consumers' minds through instantaneous recognition. Print, in essence, is about repetition.

Of course, printing and literacy are two concepts that go hand-in-hand. McLuhan argued that literacy—a direct result of printing technology—has gradually distanced members of society from true societal and cultural bonds. In other words, the more literate or well-read individuals in society become, the more they become detached and independent of that society (p. 76). McLuhan (1962) posited, "Until now a culture has been a mechanical fate for societies, the automatic interiorization of their own

technologies" (p. 76). His belief is that the introduction of technology and, most importantly, printing technology, degenerates an individual's need and dependence on community. From a simplistic linear perspective, his argument could be summed up as: printing begets literacy begets independence begets osmosis and the continual splitting and re-splitting of communal groups. "The difference between the man of print and the man of scribal culture" wrote McLuhan (1962), "is nearly as great as that between the non-literate and the literate" (p. 90).

Clearly, as societies evolved and cultures emerged, the mechanization of print provided a new method in which to mass manufacture a tangible product with an indefinite life-cycle that could be bought and sold on the open market. McLuhan (1962) contended, "[p]rint was the first mass-produced thing, so it was the first uniform and repeatable 'commodity.' The assembly line of moveable type made possible a product that was uniform and as repeatable as a scientific experiment" (p. 125). Until the introduction of moveable type, products sold on the market were individually crafted by hand. Potters, blacksmiths, weavers, coopers, and carpenters all single-handedly built or constructed their wares one-by-one. This resulted in low productivity and low market saturation. Additionally, from the eighth to fifteenth century, books were hand scribed by young monks who sat for endless hours in their monastery's scriptorium copying texts day-in and day-out. This yielded a book every two months or so. Because of this method of reproduction, books were extremely expensive and could only be obtained by the more affluent population and/or clergy—who were literate. As a result, the art or craft of calligraphy gave way to the printing firms and publishing houses, thus forcing scribes to either join the print production milieu or enter the realms of book selling.

The word literate assumes that a person has the cognitive ability to visually recognize phonetic symbols that form words and sentences and purvey contextual meaning in the form information and—most importantly— knowledge. With the evolution of a literate society, print has been able to make accessible and advance all forms of knowledge to the entire literate population at their convenience. Book shops and libraries emerged to sell and house books and manuscripts for the community. Print is the catalyst to knowledge access and, as we shall see, the evolution of the world of electronic communications. Regardless, no other form of mechanization has changed

the instantaneous availability of information than printing technology. McLuhan (1962) wrote, "This principle of translating non-visual matters of motion and energy into visual terms is the very principle of 'applied' knowledge in any time or place. The Gutenberg technology extended this principle to writing and language and the codification and transmission of every kind of learning" (p. 155).

Like McLuhan, Sven Birkets (1994) postulates that the successor to print—as an agent of significant social change—is the world of electronic communication. Although less concerned than McLuhan with the historical value associated with the technology surrounding printed matter, Birkets (1994) argues that society is currently experiencing a paradigmatic shift from the printed word. He writes, "This shift is happening throughout our culture, away from patterns and habits of the printed page and toward a new world distinguished by its reliance on electronic communication" (p. 118). Birkets' (1994) appreciation for the significance of print as a quintessential factor for the evolution of literacy is not paramount to his theory of the major current changes affected by the Internet and electronic communications. "Print communication requires the active engagement of the reader's attention, for reading is fundamentally and act of translation. Symbols are turned into their verbal referents and these are in turn interpreted," writes Birkets (1994), "Print also posits a time axis; the turning of pages, not to mention the vertical descent down the page, is a forward-moving succession, with earlier contents at every point serving as a ground for what follows" (Birkets, 1994, p. 122).

Birkets (1994) argues that the electronic order—experienced today through the Internet—is essentially opposite to print in that information travels through a network of channels easily accessible to everyone engaged or authorized to engage in the stream of data. In other words, the information in a book is only accessible to whomever possesses it, whereas, electronic information is accessible to everyone simultaneously. "If the print medium exalts the word, fixing it into permanence," Birkets (1994) contends, "the electronic counterpart reduces it to a signal, a means to an end" (p. 123).

Unconscionably, the evolution of society has been greatly and adversely affected by the printed word as a product of revolutionary technological advancements of print mechanization. Through the development of literate cultures and acting as the conduit for major political reformation, printing and the product of print—words—have shifted humanity over the past 500 years into a progressive civility like no other catalyst of change. Additionally, the printing process and the technology associated with it have risen into the commercial sector to become the third largest revenue generating industry in the world. As a result, many printers have earned a great wealth and have lived financially secure and productive lives. Throughout all of this great change, however, one minute yet highly important component of the printing industry has transitioned through time to become second to the technological advancements of the industry—the print production worker.

The Evolution of the Blue-Collar Print Production Employee

Skill acquired in any printing-house or any city is easily turned to account in almost any other house or city; that is to say, the inertia due to special training is slight. Also, this occupation requires more that the average of intelligence and general information, and the men employed in it are therefore ordinarily more ready that many others to take advantage of any slight variation in the demand for their labour from one place to another.
—*Thorstein Veblen (2001, p. 67, para.2)*

With any technological shift, especially associated with the changes witnessed over the past 150 years during the industrial revolution, personnel who operate antiquated equipment—equipment that is considered slow and inefficient—eventually have to learn new skills or be trained how to operate new and innovative equipment. This is true with every industrial manufacturing entity. The automobile industry introduced automation, which resulted in the retraining and repurposing of thousands of production personnel. The same is true with the tire industry and the introduction to vulcanization and tire making. Still, these manufacturing facilities required a limited-skill and uneducated workforce, just strong men who could operate or function on the manufacturing line.

Aside from the introduction of robotic automation, the workforce in automotive manufacturing plants today still do not require highly-skilled and highly-educated personnel to operate the equipment on the production

line. Of course, the intent of the argument presented here is not to berate the workforce employed within American manufacturing firms, nor is it to suggest that traditional line positions employing blue-collar workers require limited skills in order to produce high-quality output. It is to show, rather, how the emergence of printing as a highly respected craft facilitated by prominent aristocrats in a society long ago has gradually transgressed to become a common commodity reliant on a forgotten, under-skilled and technologically challenged blue-collar workforce. The rise of capitalistic industrialism, coupled with technological advancements, has essentially morphed this respected workforce into a seemingly lower social class that has become secondary to the organization's overall mission and future directives.

How would William Caxton's life be different today? A distinguished and well educated businessman who was considered to be a noble craftsman in his time, Caxton apprenticed a growing workforce that consisted of educated and literate men. To be a printer from the fifteenth century well into the nineteenth century was a very honorable, revered, and respected occupation. Apprentices employed in the printing trades were required to read, have experience in foreign languages, and have a mastery of the gradually evolving grammar, syntax, and punctuation guidelines developed at the time. This is completely in contrast to today's employment requirements for an entry-level production line employee on a large web printing press. It is assumed that the employee can read, but the language does not matter.

Today's highly automated printing presses require production personnel to periodically take applicable quantitative readings, enter them into a computer, and let the automation protocol make the necessary adjustments during the production run. Many of these employees speak English as a second language. However, their language skills are quite rough and they are often hired only because they are expendable and inexpensive to employ. Most assuredly they are given minimal training and often misguided due to communication deficits. Consequently, without proper training and attention to the workforce, the overall quality of output can diminish and, most importantly, safety can be jeopardized.

Is capitalism and technology to blame for this change? Frederick Ferre (1988) writes:

The needs of the capitalist rulers lead to ever-increasing concentrations of workers, as industrial technologies in the service of profits grow larger and larger, with new markets to feed—and feed upon. At the same time, the needs of capitalism also have led to widespread literacy, made possible by the technology of printing and made economically necessary by the factory environment in which workers need a modicum of education to function at a profitable level of efficiency. The two technological forces in combination are an explosive mixture. As the exploited workers are forced together in greater numbers by technologies of the industrial system, they also are made aware, through technologies of educational and mass communication systems, of their exploitation, of the injustice for their circumstances, and of their raw power to revolt against the masters.
— (Ferre, 1988, p. 57, para. 1).

Ferre (1988) argues that the invention of printing—the technology itself—is the determinant for the severity of change that has transformed the workforce within this industry. In other words, an educated, literate, and industrial society is the direct result of printing technology. However, as this technology progressed in an age of industrialism, the highly skilled workforce employed within it became obsolete as automated technological innovation—coupled with a distinct drive to increase production efficacy and profits—became more prevalent.

For all intents and purposes, this gradual period of change essentially took place at the origination of the industrial revolution or the mid to late 1800's to the present day. This particular duration of time will henceforth be acknowledged as the Bluing of Collars (BOC) period.

During the BOC period, many changes took place with regards to those who held the position of printer or master-printer. These changes encompassed artistic skills, writing and communication skills, societal class standing, organizational hierarchy, and decision making authority. Herbert Blumer (1990) posits that the impetus to this change is driven from the development of a new kind of economy solely based on a production mentality. Blumer (1990) writes that this new economy is "[b]ased on the utilization of physical power such as steam and electricity, the replacement of hand labor by machines, and the development of a factory system. Appearing and develop-

ing as a new type of economy, it has moved group life from an agricultural base to an 'industrial' base" (p. 2). Blumer (1990) also contends that the new economy is the catalyst for the changes in the organization of work, "[c]hanges in the kinds of groups in which people live, changes in social relations, changes in residence, changes in institutions, changes in standards of living, changes in interests and objectives, changes in values and ideals, and changes in problems of social control" (p. 2). The industrial base, therefore, is considered to be paramount to the greatness, vastness, and profoundness of change experienced during this time.

The new economic order, sparked by industrialism, became the solid foundation for the emergence of true profit-driven capitalism. It was at the beginning of the industrial revolution when the upper-class (usually associated with a particular industry) could see real profits in the mechanization and mass production of products that, in effect, was the impetus to commercialism and consumerism. Ironically, as consumers (as seen in the eyes of capitalists) evolved, and large profits were generated, more and more venture capitalists began building factories in order to compete in the open market. With the increase in consumer products, commercialism was brought to a new level with the introduction of marketing initiatives through printed products that included newspaper advertisements, posters, flyers, billboards, product marketing collateral, books, pamphlets, and, not to forget, business cards, letterhead stationery, and envelopes. As a result printing plants grew tenfold in order to keep up with the demand and, consequently, the pressure to automate the printing production process, increase output and turnaround (speed of production), forced the focus from the quality of craft to the quantity of the product.

Thomas Patterson (1999) contends that capitalists incur expenses associate with raw materials, tools and, ultimately, labor. Patterson writes, "That is the labor power of the workers, whose wages the capitalist pays in return for their knowledge and activity as the producers of the particular commodity. By exerting their labor power, the workers produce a given product that has value, which the capitalist—as the owner of both means of production and the goods produced—realizes when he sells the commodity in the market. In other words, it is the workers, and only the workers, who create value" (Patterson, 1999, p. 32).

With the emergence of newly established printing companies, the trade of printing and print making became obsolete as automated or streamlined printing technology emerged. Electric motors placed on drive trains assisted in increasing production. New letter-press technology that was "self-inking," using mechanically automated roller systems, provided less interaction from the printer/operator. This technological shift eventually led to change in the employer's requirements of labor entering the workforce, a need predominately for men who need not read nor write but can learn a couple of skills required to operate a printing press. In turn, they would receive a "fair day's wage."

Patterson's (1999) point is well made, in that, in the infancy of capitalism, the workforce was valued. However, as this workforce became accustomed to a changing economic order—one that increased their standard of living—social problems began to emerge as the workforce came to the realization that they were perhaps being exploited. Other problems such as "unhealthy and dangerous working conditions; congestion of workers in poor living quarters; absence of adequate housing, sanitation, medical care, and schooling" (Blumer, 1990, p. 10) began to emerge. As a result, the workforce en-masse began to question their conditions and seek concessions in order to increase their standards of living or improve their working environments.

This movement, albeit gradual, provided significant leverage on printing press manufacturers to develop enhancements in more areas of automation. Automation, after all, requires less labor and, inevitably, less skill to operate. By strategically reducing labor and, consequently, skills of personnel who commanded less wages, capitalists who owned printing companies were able to increase production and profit margins with their newer technology. Patterson (1999) posits that the visionary capitalists desirous of increasing productivity and output were successful when they were able to acquire machinery that "perform the same tasks more rapidly and make the workers mere appendages of their tools." This, according to Patterson (1999), "[i]nvolves the mechanization of the production process, the displacement of skilled workers, the incorporation of unskilled workers—often women and children—into the labor force, and rising unemployment or the growth of a reserve army of labor" (p. 33).

There have been significant technological and innovative enhancements introduced to the world of printing over the past 100 years. Letterpress moved to offset lithography; the introduction of roll-fed or web press gravure technology increased production volumes exponentially; and flexography emerged to become a steady and practical print methodology. With all of this automated changing technology saturating the industry, however, labor became secondary and less valued. Presses that once required a shift of ten personnel now require two. A piece of bindery equipment that once required three to four knowledgeable operators now requires only one person to successfully operate it. Additionally, since the onslaught of electronic documentation and the emergence of the computer, typesetters who once set lead type by hand were replaced by the arrival of the Apple Macintosh computer. Thousands of jobs were displaced when the stripping and masking areas of printing production were replaced with electronic imagesetters and computer-to-plate (CTP) systems. Technology has taken a major toll on the once valued print production laborer.

The question arises, "where did this displaced workforce go?" Many of former stripping and masking personnel were thrown in front of a Mac and asked to imposition pages electronically. Many retired, left for another position at another company, or merely left the industry all together. Others were "re-purposed" onto the production floor or into customer service positions. Many became frustrated and/or worked poorly in their new positions because of their inability to successfully operate the equipment. This is what Beth Rubin (1996) refers to as deskilling. She writes (1996), "One result of scientific management, worker specialization, and the use of new production technology is often to deskill and cheapen labor. Deskilling refers to transforming skilled work into unskilled work." Rubin (1996) posits that when the capitalist removes "the skill involved in the job, employers have more control over the process, and workers have less" (p. 68). This stage in the paradigmatic shift represents the final transformation from the highly skilled craftsman to the industrial laborer to the service-based knowledge worker.

Conclusion

In retrospect, there are many contributing factors to the changes that have fueled the shift, including economic, social, technological, industrial, and organizational. However, one consistent inadequacy becomes evident from many different perspectives, and that is education and training. For over 400 years, or until the mid-to-late 1800s, printing craftsmen trained under a tutelage/apprenticeship system. Once a young man had studied under a master craftsmen for up to several years, he was given the status of printer and was free to work independently for either his master trainer or to set-up a business elsewhere. This was the case for William Caxton and his apprentice/heir Wynkyn De Worde. Although apprenticeships still exist in today's print production facilities, students are only exposed to one particular production component of the process and are measured on their ability to master one production task.

With the development of highly complex centralized electronic enterprise decision support systems (DSS), innovative printing organizations require all plant personnel (both line and staff) to interact with one another on a daily basis. For thousands of print production personnel across the country, effectively communicating through a computer interface (PC) is a very difficult and angst-ridden experience. Usually because of finances or lack of logistical planning and facilities, basic PC skills and communication training are viewed by white collar management to be overly expensive with a minimal return-on-investment. However, as a vendor remotely logs on to a printing press digital interface to perform some maintenance diagnoses, this activity requires interaction with the operator. The operator, intimidated by the technology and by his/her inability to communicate effectively in an on-line environment, inadvertently provides the incorrect information thus resulting in unnecessary down-time that costs the company thousands of dollars. Beth Rubin (1996) posits, "Computers, for example, create not only flexibility but also a labor force distinguished by computer literacy" (p. 53).

Rubin (1996) argues that the mundane world of manufacturing (such as an assembly line), from laborers' perspectives, disengages them from the corporate culture, thus alienating them rendering them with feelings of "powerlessness, meaninglessness, isolation, and separation" (p. 68). This is exactly why a grass-roots effort should be developed and launched at providing basic computer skills, writing, and communication training for production employees. Such training would assist workers in communicating more effectively, researching archived documentation and knowledge more effectively,

generating written correspondence more efficiently and effectively, enhancing their overall self-esteem, and engaging them more within the corporate culture. Rubin (1996) writes, "Workplaces that use dynamic flexibility strategies require highly educated and skilled workers who are familiar with computers and other advanced technologies and can respond rapidly to changing markets. Dynamic flexibility relies on employee commitment to the organization and willingness to use their knowledge, skills, and effort to continually improve the product or service" (p. 74).

Juan Doe works on a large MAN Roland gravure printing press as a web tender for a prominent printing company. He works four ten-hour shifts a week making $16.00/hour plus benefits and has been training and employed in the same position for five years. He speaks very little English and communicates minimally with his supervisor, the head pressman, throughout the day. He does not access email or the company web portal and rarely uses the many computer interfaces wired to the mammoth press for use of diagnostics and visual progression. He knows that they exist and that those who use the technology possess more authority and generate a higher wage than him. Yet, he remains in the production position and aspires to be promoted when the time is right. Perhaps he is content, perhaps he is not, but his ability to understand the corporate culture, let alone effectively communicate within it, is highly stifled.

William Caxton, on the other hand, was a noble leader well respected by the highest echelon in his community. He worked hard and produced high quality books relished by those who could afford them. He translated documents into text and published them for members of the aristocracy. He was considered to be an artist, a craftsman who could take as much needed time to produce the finished product. He was well educated and literate and took on the task of translating and editing many texts and creating a style of punctuation for the easement of reading. Yet, he was a user of new technology and a master of it. Although considered to be a radical technological advancement for the times (especially from the sidelines of the church), the printing press eventually gained overwhelming popularity and changed the course of history forever.

Walter Ong (1982) wrote, "Print eventually removed the ancient art of (orally based) rhetoric from the center

of academic education" (p.131). How profound that the very industry that employe es Juan Doe communicates to him and through him orally. Ironically, technology eventually removed the ancient art of print from the center of the corporate culture. Today workers must rely on an electronic based knowledge repository and must be literate in both communicative skills and computer skills in order to access, engage, and process the knowledge gained. Gone are the days of the printer in the aristocracy, but advancements of the knowledge worker/printer are only a classroom away.

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