Visual Communications Journal

2000

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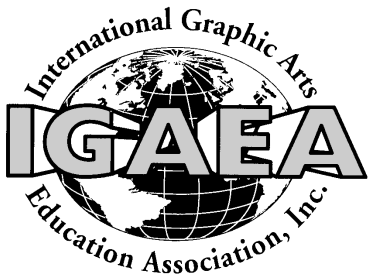
* denotes refereed article, † denotes juried article, ‡ denotes edited article, § denotes student article (see page 43 for definitions)



Visual Communications Journal

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How We Produced the Journal

Articles were submitted in both hard-copy and electronic formats. All the photographs were submitted digitally and were edited and converted to grayscale using Adobe Photoshop. Graphs and tables were converted from Microsoft Word and Excel to the portable document file (pdf) format. Then, the pdfs were opened in Adobe Illustrator and converted to the encapsulated Post Script (eps) format. Page layout and text editing, using variations of Adobe Caslon type, were accomplished using QuarkXPress.

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 the authors and do not necessarily reflect the policy or views of the IGAEA.

Article Submission

Please follow the guidelines provided on page 43 of this *Journal*.

Membership and Subscription Information

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2000

Editor's Note

This is my fourth year as editor of the *Visual Communications Journal.* During the years I have been editor, it has never ceased to amaze me how the professors and researchers interested in graphic communications think about similar things at the same time. For example, in this year's *Journal,* both Bob Chung and Penny Osmond write about distance learning through the use of the Internet. In addition, both veteran *Journal* author Chris Lantz and first-time contributor Wendy Maboudian write about how to determine and influence the *message* delivered through visual images. I don't know—maybe something gets in the water supply that turns graphics educators minds in the same direction!

After reading both Bob's and Penny's articles, I took some time to reflect on why I am so ambivalent about distance education. After all, both Penny and Bob convincingly write that distance learning is a given. In fact, Penny writes: "Those educational institutes unwilling or unable to use this technology as an alternative delivery method may not survive the next wave of change brought about by the digital age." Wow, I'd better start running now before the fire-breathing dragon catches up to me. Seriously, I do think that both Penny and Bob are right: education at a distance through the internet is probably here to stay. But, that does not mean I have to like it.

I suppose that there are several reasons why distance education does not appeal to me. First, let me recount a recent meeting that took place in our College of Technology. A supposed "guru" of distance learning—one who sells well-regarded customized on-line learning programs to several well-known Houston-based oil companies, was invited to give our faculty a presentation of his wares. As he displayed page after page of poorly designed, boring—even goofy—text and graphics, I could not help but be reminded of the old "programmed instruction" workbooks that we were forced to make in graduate school. At the very best, those programmed books succeeded in conveying only the very lowest of Bloom's taxonomy of instructional objectives: knowledge. Not only was the instruction low-level, but it was also *boring*—no, make that *BORING*. The guru's on-line examples were no better—the pages presented a little bit of information followed by lots of drill-and-practice that tested for the exact same verbiage, word-for-word, as the previously-presented lesson. Where's the synthesis? Where's the evaluation?

Even our beloved Graphic Arts Technical Foundation's Prepress Training Program CD is no better. It's all the same: a tidbit of information followed by drill-and-practice that, for all practical purposes, requires students to do no more than regurgitate what they just read.

After the rather tragic meeting I described above, our resident in-house guru explained that things can be done better. Our faculty, she pointed out, do things much better and use the technology more effectively. Well, as I perused course evaluations for our distance-education courses, I read "boring...., chat rooms didn't work....., software is unreliable...., best part of the course was the day I came to campus....I could see passion in my professor's eyes for the first time." Bob, in his article, confesses just about the same when he states: "students felt that they would have preferred more help and guidance in completing their lab assignments."

Several of the faculty in our department are not jumping on the distance education bandwagon. We prefer to be able to look into our students' eyes, to crack jokes with them, to hug them when they tell us they're getting married, and to chew

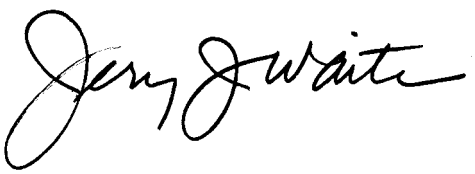
them out when they're not working up to our expectations. One of those reactionary professors forwarded an e-mail to me from no less than the *Journal of Higher Education*. It seems a bunch of professors are having less-than-acceptable results with distance education. For example: "Undergraduates enrolled in introductory psychology perform better in distance-education courses, but are generally less happy with them, according to a study by Ruth S. and William S. Maki, two psychology professors at Texas Tech University." Maybe the students rote-memorized content, but they lost the essence of what human interaction in a course should be. Another example: "David F. Noble says distance education is fool's gold, and he's eager to point out who the fools are. In speeches, essays, and countless sound bites, the professor argues that the primary motive behind the craze for online education is *profit* rather than pedagogy, and that the glimmer of dot-com riches is tempting some administrators to *put the core values of their institutions at risk*." (Italics are mine.) Bob admits the exact same phenomenon in his paper about distance education at RIT.

Another reason I'm skeptical is related to my own experience using distance education technologies. Yes, I, the reactionary, have used closed-circuit interactive TV technology to teach on-line. I've taught an on-line course twice: it's called Graphic Communications Materials and Processes and I teach it for our own University of Houston students as well as students enrolled at Kingwood College, a community college located about 50 miles north of Houston. I do it because the curriculum at Kingwood College requires that their desktop publishing students must learn a little bit about printing (what a concept!) and they don't have anybody who is qualified to teach what ink-on-paper is all about. So, to be of service to those students, I gave in. Now, you must understand that both the University of Houston and Kingwood College have state-of-the-art closed-circuit television classrooms manufactured and installed by V-Tel. It's sophisticated technology that works well. The students in both locations can see me and I can see them as well. Problem is, the Kingwood students appear to be to be all of about five pixels on the TV monitor that is built into my teaching console. Another problem: when I look at my "live" students, I'm actually looking away from the Kingwood students. What's worse, when I look at my distance students on the monitor, I have to look down—away from the camera—so that I can see them. What do the distance students see? The top of my head. What about that staple of all good graphic arts teachers—samples? My live students can see, touch, and even smell the real thing. But, my distance students can only see a TV-resolution image of the real thing.

When I receive the student evaluations from both campuses, the differences are like night and day. "Distance students say remarks such as "boring, too long, hard to stay awake, couldn't see the examples well." The live students say "dynamic professor, great personality, likable guy," and so on.

Maybe the most compelling reason that I do not want to jump on the distance education express is a card I received the other day from one of my students. She had been doing OK, then she bombed the midterm. During lab, I pulled her aside and asked her if she was getting frustrated or disheartened—was I asking too much from her? She said no, that she liked the class and was just a little overburdened by her work schedule. I thought absolutely nothing about it—after all, I chew-out, cajole, motivate students all the time. The next class, as she was leaving, she handed me a card. I did not open it right away because a swarm of other students were around. However, later that night, I pulled it out of my PowerBook bag and opened it. I started to cry. She told me that I was the only professor who ever showed her that I cared about whether she did well or not. She said I am her favorite professor. I'll tell you, I did not cry out of pride. I cried in agony for her because others never showed her they cared. She takes most of her courses on-line.

So, all of you who wish to teach on-line, I wish you luck. I know that students, businesses, and college and university administrations are clamoring for you to do it. Penny doesn't think that people who refuse will survive. Maybe she's right. But, I'll take my chances.



Graphic Communications Education: Where is it Headed in the New Millennium?

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Since Gutenberg first cast moveable type in 1455, graphic communications education has met the needs of a well trained and progressive industry. It has taken various forms over time, including apprenticeships, on-the-job training, and formal education programs. Gutenberg was no doubt involved with the craft system of his day, which employed apprentices who began their learning process through very menial tasks around the print shop. As time progressed and skills were developed, the apprentice earned the rank of journeyman and was empowered to set out on his own. The apprentice system is still in use in many union shops with some classroom training and much "on-the-job training." The new hire, whether in a union shop or not, will often begin with menial tasks and learn his/her new craft by working along side a skilled craftsman. Prepress positions most often require some type of background with appropriate software.

Another route that many are taking to the printing industry is through the formal education process, often beginning as early as the middle school grades. Programs in graphic communications are also offered in high schools, vocational centers, community and four-year colleges and universities. Some students enter these programs without much knowledge of what graphic communications is all about. Friends or family may have told them it would be a fun and interesting course. Once enrolled, many find a new home in a realm in which they were previously unfamiliar—activities with computers, images, photography, and ink-on-paper make them feel welcome. The skills they learn and the creativity developed transform them into a valuable employee upon graduation.

What is Graphic Communications?

The route to graphic communications education is often blocked in part by definition and terminology, particularly at the higher-education level. Is it graphic arts, graphic communications, printing, imaging, some combination of these terms, or something entirely different? College and university programs are assigned a CIP (Classification of Instructional Programs) code, which emanates from the Department of Education. Unfortunately, there is no code for graphic communications at the present time. That makes it impossible for a student to indicate graphic communications as a field of study on an SAT or ACT test application. The Occupational Outlook Handbook provides only limited coverage of graphic communications occupations. And, without a CIP code, graphic communications is omitted from the College Entrance Examination Board Index of Majors and Graduate Degrees.

As a first step to remedy this situation, members of the International Graphic Arts Education Association (IGAEA) adopted a resolution to promulgate a clear definition: *"Graphic communications—the processes and industries that create, develop, produce, and disseminate products utilizing or incorporating words or pictorial images to convey information, ideas, and feelings. Graphic Communications products facilitate learning, enjoyment, motivation, and commerce. Graphic Communications includes the family of market segments embracing the technologies of printing, publishing, packaging, electronic imaging, and their allied industries; they are often referred to as the graphic arts, print, or imaging industries."* The Graphic Communications Council, and almost fifty other graphic communications industry or education associations and organizations, have reviewed, improved, and endorsed this definition. The new definition was submitted to the U.S. Department of Education in October 1999 so that a CIP code can be assigned.

Where are the Jobs?

Once students learn what graphic communications is, they want to know if the jobs will be there at graduation. According to all published reports, the printing and publishing industry is in desperate need of trained individuals at every level. *Newsweek* Magazine reported, in its February 1999 issue, that desktop publishing jobs were expected to increase by 74% between 1996 and 2006. Printers are constantly asking educators, "have you got anyone who can run a press?" Or, they might ask for someone who knows prepress software, or an individual who has supervisory capabilities.

Prospective students also want to know what salary range they can expect upon entering the workforce. Unfortunately, many printers offer new graduates minimal starting wages and salaries and give little credit for educational experience. Students often find they can earn more at local fast food chains or markets than by offering their skills to area printers.

Just Keeping Up

Once students are recruited into an educational program, instructors face a formidable task: to mold an often unruly individual—particularly in the middle and high school grades—into a skilled, employable craftsperson. The resources of most educational programs are inadequate: therefore, the purchase of new equipment, not to mention constantly upgraded software, is limited. And, keeping up with technological change is nearly impossible for teachers. After Gutenberg's invention of moveable type, the next great step took 400 years: the invention of the Linotype. Today, a technological innovation occurs almost every 400 minutes.

Educators are not left completely alone to face the onslaught of technology. There are numerous organizations and associations willing to update educators. The International Graphic Arts Education Association (IGAEA) is an association for educators from all levels—middle school through college. This educator-run organization sponsors an annual conference each August with presentations by major industry speakers and hands-on workshops. Throughout the year, members are kept informed of organization activities through an ongoing publications program. For more information, check out the IGAEA website at www.igaea.org. The site includes officer contacts, publications, and items of interest to members. There is also a direct link to the next year's conference site.

Other sources of information and update for educators include the Printing House Craftsmen, Litho Clubs, and the Graphic Arts Technical Foundation (GATF). GATF sponsors teacher updates at major trade shows and teacher institutes during the summer. Educators also participate in industry sponsored seminars, often at their own expense. Many trade publications provide no-cost subscriptions to educators for classroom use. Graphic communications classes have open invitations from many printers to tour their facilities for that close up look at the real world of printing. In addition, a website for graphic communications educators, called Graphic Com Central, is available at http://TechEd.vt.edu/gcc/. This site provides an exhaustive compilation of web links, resources, assignments, and projects for inquisitive educators.

Problems for Educators

All is not rosy for graphic communications education. The financial resources of many school districts are extremely tight. Therefore, when enrollment in graphics classes drop, or when a faculty member retires, the administrator's first thought may be to close the expensive graphics program.

Recruitment of students is also difficult because printing and publishing, even though its products surround us, remains a hidden giant rarely promoted to the general public. The average magazine or catalog subscriber never sees a credit line for the world's largest printers—R.R. Donnelley or Quebecor-World—who may have done the printing. Who printed that cereal box sitting on the breakfast table, or that label on a soft drink can or bottle? No one knows, because the printer is never given credit. In addition, due to the fragmentation of the industry, printing industry associations seldom pull together in an advertising campaign similar to the "thanks to the world of plastics" ads.

Equipment and supplies to run a graphic communications program are very expensive, not to mention the expense of continually updating software. District financial officers would rather place

Windows-based computers in graphic arts classrooms than the more expensive Macintoshes. Unfortunately, when the industry comes through with support, it is usually for a few big-name universities. This leaves the average teacher wondering, "will my turn for a crumb ever come?"

Not only does student recruitment present educators with the problem of having a full classroom, positions for educators often go unfilled at every level. At any given time, there are numerous position announcements for college and university professors with advanced degrees. When graphics teachers retire or move, leaving vacancies at middle and high schools, trained faculty are difficult for school districts to locate. Because of the shortage of college-educated graphic communications instructors, many school districts recruit tradespeople who would like to try teaching. Unfortunately, doing so is a two-sided coin. A person from the trade may only know a single area very well, and may have little background in the entire spectrum of graphic communications. Also, such teachers' employment is conditional until teaching certification is obtained by completing specified college coursework. Many professionals who have been away from school for years are reluctant to return to the classroom as a student.

Graphic communications educators face a myriad of problems: student recruitment, graduate placement, technologically current equipment and software, and even whether they will have a job next year or not. And, if the program is alive and well, where is the technology headed and what should the next lesson plan cover?

The New Technology

Advances in digital technology bring amazement and wonder with every step down a trade show aisle. Not too many years ago, we saw desktop publishing, faster presses, and something called the internet. Now everything is digital: e-printing, digital photography, and digital workflows culminating in digital printing, direct-to-plate, and direct-to-press. Many school programs are still struggling along with a process camera and ABDick or Multilith press. The funding just does not seem to be there for big ticket items like imagesetters—even less for platesetters or digital printing units—and probably will not be in the foreseeable future for most educational programs. Some programs, with budgets as little as $1,000 per year, are producing page-layouts using word processing or even using presentation graphics programs.

With this type of funding, how do we enter the world of the digital workflow? If you cannot do it, why not show it? Many of the manufacturers of digital equipment have produced videos or CDs showing their equipment in action. These are often available at little or no cost. Another way to display new technology in the classroom is to visit trade shows in your area. Pick up samples from digital printing units and direct-to-plate equipment. Show-and-tell is not just for first grade anymore. A well done classroom lecture with a number of samples can bring new technology to life in the minds of students.

But trade shows are too far away, you say? Remaining current in technology may require a drive of several hours and an overnight stay, perhaps at personal expense. Most trade shows run through Saturdays, so you can attend even if a day off from class is not possible. Or, do a fieldtrip and take the class. Have a fundraiser if travel is a financial problem. Sometimes, to remain current with technology and keep your class up to date, you have to go the extra mile, even if it means doing it on your own time. Once your supervisor finds out that you are out there making every effort to keep up, new equipment may come along.

In every trade journal you pick up, graphic arts prognosticators are forecasting the demise of film and the move to direct-to-plate and digital printing. Direct to metal plate units begin in the six figure range. Even low end direct-to-plate devices that produce silver polyester plates begin around $30,000. However, for under $5,000 you can produce direct-to polyester plates on an HP 5000 laser printer. With educational pricing, you may be able to get that unit for even less. (That $5,000 is a package deal available from several vendors. The vendor-supplied model has been modified to give less toner scatter on the plate. Results may not be equivalent if an unmodified HP is purchased.)

Finally, what about attending an IGAEA conference as a means of keeping up to date? Each conference boasts industry speakers, hands-on workshops, and an opportunity to network with fellow educators.

There is no excuse for walking around the lab with a "woe is my program" attitude in the new millennium. Get involved with a local trade association, visit a local printer, write for a video or CD on current technology, and revise lesson plans to present the digital future to your students. Your students may not have hands-on experience with the latest equipment, but at least they will have some knowledge of the processes and how they work. Then, your graduates will enter the industry with an appreciation for the technology, rather than stare at it like a cow at a new gate.

David W. Dailey

Professor

David W. Dailey received his doctorate in education from the University of Kentucky in 1995. Prior educational work includes a Specialist degree, Master of Industrial Education and BS in industrial education from Clemson University. He has been teaching in the Department of Technology at Eastern Kentucky University since 1989. Dailey is responsible for teaching courses in beginning and advanced graphic arts and photography. He also advises associate degree Computer Electronic Publishing majors and undeclared students.

Adopting Distance Learning in Graphic Communications Curricula

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Abstract

Change can be seen everywhere. Printing and graphic communication educators are busy infusing digital imaging technologies into their curricula. At the same time, teaching methods are also changing at a rapid pace. Through the use of the Internet and instructional media technologies, it is now possible to teach students at any location and at any time.

Distance learning is often referred to as on-line instruction. The author's adventures in adopting distance learning are described in this paper. It has been written for printing faculty who are interested in adopting distance learning techniques. It explains what makes on-line instruction so appealing. The author also discusses the distance learning program used by the college in which he teaches, and his personal experiences in preparing for and teaching two courses in the distance learning format. Surveys of students' opinions regarding their learning experiences, and the author's personal assessment are also discussed.

Introduction

The author has been a faculty member in the Rochester Institute of Technology's (RIT) School of Printing Management and Sciences since 1980 and has taught digital imaging in printing and publishing. His involvement in distance learning began in the spring of 1997 when Xerox Corporation commissioned RIT to develop a series of distance learning courses in digital imaging and publishing technologies for its employees in multiple locations throughout the United States.

Issues and Concerns

From the initial stage of the project, the author faced a number of issues that were important in the development of distance learning courses. The issues included shifts in the demographics of students, the role of faculty and administration in offering distance learning education, and technologies for on-line education.

Shift in Demographics

The first issue was a shift in demographics. There has been a significant reduction in the number of high school students entering the School of Printing Management and Sciences at RIT during the past 20 years. In 1980, the author taught only one three-credit course every quarter along with six repeated lab sessions. The teaching load was 20 contact hours per week with 60–70 students per quarter. In the early 1980s, teaching productivity, in terms of the number of credit hours per year, was three-credits times 200 students, or 600 credit hours per year.

In the 1999–2000 academic year, the author was responsible for teaching five courses and he taught three courses per quarter. Class size varied anywhere from six students, in a professional elective course, to sixty students in a required sophomore course. There were no longer any repeated labs. There is no question that the author covered more subject areas. However, his teaching productivity, in terms of credit hours generated per year, significantly dropped to 300–350. In other words, the determining factor in teaching productivity is mainly the number of students enrolled in the class, not the teaching capacity of the faculty.

A growing trend in higher education is that adult students are returning to college either for degrees or for short-term training required by their jobs. Many institutions now compete fiercely to reach these adult learners.

Role of Faculty and Administration

The second issue that the author wrestled with

had to do with the role of faculty and administration in higher education. The administration contends that the student enrollment drives the operational budget. On the other hand, it is the faculty who are in charge of curriculum development and its delivery. The bottom line is that both faculty and administration are challenged to keep an up-to-date curriculum in order to attract more students and to drive the student enrollment up.

RIT has been investing in its distance learning program since early 1980s, and has conducted numerous educational technology workshops to help faculty members adopt on-line instructional technology. RIT currently has 14,000 students and over 2,000 of those students study from a distance. The number of distance learning students and courses are expected to grow at a compound 10% rate for the next several years (The Edge, 1999).

Technologies of On-line Education

Hardware and software used for on-line education continue to change at a very fast pace. Distance learning began as early as 1981 using hardware like Apple IIe (with 48K of memory!) and 300 baud modems (Andrew Feenberg, 1999). Today, we have personal computers equipped with 1,000 times the memory and 100 times the data communication speed—all for almost the same price as the old Apple IIe.

A number of easy-to-use on-line communication technologies are ubiquitous. For example, FirstClass conferencing software serves as a virtual classroom. The Internet is used to disseminate class information via friendly web browsers. E-mail correspondences with instructors can take place on a daily basis. Thus, the content delivery process for distance learning and the student-faculty interactions have become more enabling and cost-effective than ever before.

Self-awareness

Paradigm shift is a concept which describes how the rules of any process, including society itself, change, and why old processes are replaced by new ones. Moving from analog- to digital-imaging in graphic arts is a prime example of a paradigm shift. Paradigm shifts often result in the need for employees to update their work-related skills.

Traditional classroom teaching requires both the students and the teacher to be in the same place at the same time. In order to serve the growing needs of adult learners, who often cannot afford to leave their jobs and homes, on-line distance learning—at any place and at any time—may be the paradigm of education in new millennium. The author strongly believes that adopting distance learning is necessary to enhance teaching productivity and to maintain the viability of an academic program.

When the author prepared his distance-learning courses, he was fascinated by the capabilities of communications technologies—for example, high bandwidth videotape, vast Internet resources, and user-friendly conferencing software with around-the-clock email capacity—as instructional tools. Using these enabling communications technologies, on-line instruction can reach a larger pool of students. Thus, teaching productivity can be increased.

In traditional classroom teaching, faculty who own the content are always involved in the delivery process. However, when the content is captured on video and is distributed by the distance learning department, the faculty member may no longer have total control of the delivery process. Thus, a dilemma exists: should a professor increase teaching productivity through on-line delivery and face the possibility of losing control of instructional contents or should that professor maintain the status quo? There is really no clear solution to this dilemma. The only way to find out is to implement distance learning and evaluate the outcome.

Distance Learning Preparation

The author's first distance learning course, *Imaging Technology*, was a sophomore level course. All lecture outlines were prepared using Microsoft PowerPoint, and were videotaped at RIT's professional-quality television studio. Videotapes, unlike text-based media, offer a high bandwidth which is suitable for recording color images for visual demonstrations. The frequency of lecture taping was one lecture per week. Consequently, it took four months to tape the entire lecture series. The course was offered in the summer of 1998 to 30 Xerox employees located throughout the United States.

Compared to lecturing in a typical classroom, videotaping requires professors to make some physical and mental adjustments. For example, one must become comfortable in front of video cameras and intense lighting. In addition, lectures must be clear and concise because there is no opportunity for question and answer sessions during videotaping. Fortunately, the taping process becomes easier after the first few sessions.

In addition to taping lectures, the author prepared a number of instructional materials, including lecture outlines and self-quizzes, using the Portable Document Format (PDF). These materials were made available to students, using the FirstClass program, at the beginning of the distance learning course.

The second distance learning course, *Color Perception and Measurement*, was offered in the spring of 1999*. The author used a process similar to the one he employed when preparing *Imaging Technology*. However, he was much more comfortable with the technology. Therefore, the process became easier.

On-line Teaching and Learning

The notion of "asynchronous learning—anytime, anywhere" infers flexibility. However, without structure and discipline, this flexibility can lead to chaos and ineffective learning. Therefore, the ultimate success of a distance learning course depends on structured teaching and disciplined students. Faculty can help instill structure by setting up a course calendar for students to follow, posting reminders about test dates and homework assignment due dates, and so on. However, the discipline to stay on schedule—and not fall behind—must come from the students themselves.

FirstClass Conferencing

Unlike the Internet, which is wide open to the public, FirstClass is groupware that only registered students can access. Figure 1 shows the appearance of the FirstClass' user interface for the *Imaging Technology* course. At the beginning of the quarter, the course syllabus, tentative course calendar, and lecture outlines were placed in various folders that could be accessed through the interface. Since there was no face-to-face communication, students were asked to introduce themselves by posting notes in the "Introducing Yourself" folder. In addition, FirstClass was also used for chat sessions, submitting, homework assignments, posting test scores, and so on.

Figure 1. The FirstClass conferencing software is the virtual classroom.

The author was able to use his desktop computer and an Ethernet connection to access FirstClass on campus. He relied on an Internet service provider, a phone or cable modem, and a Powerbook to access FirstClass when he was at home or on the road. He was even on-line with his class when he traveled to the west coast or to Asia. Again, it is modern communications technology which makes "teaching at any time, and at any where" possible.

Internet-based Resource

Teaching technology courses without face-to-face instruction in a laboratory session presents an

The Feasibility of Requiring Students to Purchase a Spectrophotometer

The *Color Perception and Measurement* course requires that all students have access to a spectrophotometer for purposes of studying color measurement and its applications in the graphic arts. The idea of owning a personal spectrophotometer or densitometer was simply unheard of in the past. However, the cost of a ColorTron II (a two-in-one color measurement device for Mac and PC), offered by X-Rite at a student discount price, proved that it was possible to do so.

** See sidebar at right*

extra degree of challenge. What many do not know is that the Internet is not only a content delivery mechanism, but is also a rich digital imaging resource. The author decided to structure some lab assignments by utilizing Internet resources. For example, he gave an assignment in the *Imaging Technology* course by asking students to visit web sites of large prepress and printing companies to learn how they cope with web culture and with booming e-commerce. In another assignment, he asked students to find out which digital file formats are used by printing companies and their digital customers. In the *Color Perception and Measurement* course, he asked students to use AMICO, an on-line database of museum art collections, to study art appreciation and art reproduction.

On-line Quizzes and Tests

The author has been an advocate of using multiple-choice questions in tests. A number of reasons support his preference: (1) multiple-choice tests are objective in nature; (2) the tests can be graded by a test scoring program and test item analyses can be provided; and (3) a test item bank is possible.

To create interaction and to provide learning incentives, the author transformed part of his test bank into multi-session on-line self quizzes. For drill and practice, students could take these quizzes as many times as they wished. If they had difficulties understanding a particular question, they were encouraged to post their comments and questions in FirstClass for discussion.

Administering tests in a distance learning class turned out to be more complex than giving tests on campus. The author started out by sending tests in hard copy form to designated proctors for closed-book tests. The result was not good because the students and their proctors sometimes had a hard time getting together. He then tried Internet-based on-line testing using a time-limited open-book format. This second method was more successful than the proctor-based method.

Survey of Student's Opinions

Students who took the distance learning courses rated the courses and their instructors highly. Students in the *Imaging Technology* course appreciated learning the theory and practice of digital imaging, including the use of a flatbed color scanner for image capture and a personal color printer for color image reproduction. Students in the *Color Perception and Measurement* course found the laboratory portion of the course more challenging than the lectures. Even though they acknowledged that the course content was well organized, and agreed that the instructor was knowledgeable, pleasant, and helpful, some students felt that they would have preferred more help and guidance in completing their lab assignments.

It should be noted that the *Color Perception and Measurement* course was, at one time, offered as an on-campus course as well as in the distance learning format. The on-campus group was given the option to either view the videotaped lectures at their own pace or to view them during the regularly scheduled class hours. The author discussed major points of the lecture right after the videotape and provided a question and answer session afterward. A part of the scheduled class time was used to go over lab assignments and to demonstrate the use of color measurement instruments. Most of the on-campus students rated the quality of their interaction with their professor very highly. They commented that both taped lectures and lab assignments were major sources of their learning. However, some students still expressed a preference for live lectures over videotaped lectures.

Self-assessment

The author's experiences in distance learning, thus far, have been successful and exciting. Many factors have contributed to this success. The most important factor is the market demand for distance learning opportunities by adult learners across the country. The distance learning program at RIT helps increase the student enrollment. It also helps increase teaching productivity. The second factor is the fact that RIT views distance learning as a strategic imperative. The author was motivated and want to be a vital part of that initiative. In addition, strong support from the instructional media technology staff made the experience worthwhile.

Having taught distance learning a number of times, the author's initial concern of content own-

ership has become less of an issue. In the same way that a textbook does not replace the teacher, distance education does not render the instructor unnecessary. Videotaped lectures are only a part of the learning activities. Students still need to interact with the instructor—whether face-to-face or via electronic communication—in order to maximize their learning.

The author recognizes that he needs to continue to improve the quality and effectiveness of his distance learning courses. For example, he must update his videotaped lectures on a regular basis. Specific improvements include updating lecture content and replacing software demonstrations with more current versions. Another area of improvement is to further utilize Internet resources to create more lab assignments to make learning interesting and fun. In addition, he needs to work with distance learning specialists to enhance the performance of the on-line testing system.

Postscript

In September of 1999, RIT offered a digital imaging certificate program using distance learning technology. The program consisted of seven courses, and two of the courses were taught by the author. Because of the asynchronous nature of on-line instruction, it was possible for students to receive quality instruction without travelling to the campus. It was also possible for faculty members to provide quality instruction at any time and at any place.

For more information about distance learning at RIT, please go to http://distancelearning.rit.edu.

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Bob Chung

Professor

Bob Chung is a faculty member in the School of Printing Management and Sciences, Rochester Institute of Technology since 1980. He holds the rank of Full Professor and teaches courses in color perception and measurement, imaging technology, tone and color analysis, test targets, and quality control in the graphic arts. Bob received his M. S. degree from RIT in Rochester, New York. Bob was the 1991 recipient of the GATF's Education Award of Excellence, and the 1997 Gravure Exchange Professor. He served on the board of the International Graphic Arts Education Association (IGAEA), the Technical Association of the Graphic Arts (TAGA), and the Inter-Society for Color Council (ISCC). He also holds membership in Phi Kappa Phi, American Society for Quality Control (ASQC), and Graphic Arts Technical Foundation (GATF).

A Case Study of Printing Process Diagnosis Using SPC Tools

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Introduction

High quality is the goal of every printer. Achieving this goal requires more than just knowing the proper adjustments on the printing press or setting the proper tone reproduction curve in Photoshop. It requires more than having equipment that is capable of producing the desired quality. It also requires the human element, e.g., properly trained workers and goal-oriented teams (Apfelberg & Apfelberg, 1995). The two imperatives of the well-trained workers or teams are "Continuous Quality Improvement (CQI)" and "Teamwork."

The door to CQI was widely opened after Dr. Deming' s visit to Japan in 1950. The purpose of his visit was to explain quality control concepts to Japanese manufacturers (Relyea, 1992). After the successful experience of Deming in Japan, American industry finally understood that organizing for continuous quality improvement is far more important than technology itself.

Background of the study

In the printing industry, mass inspection and complex quality control bureaucracies were established to insure that defective products were not shipped to customers. However, little attention was paid to solving the problems that *cause* defective products. The result is that printers often have to pay for the expense of excessive scrap and costly rework operations, generally by increasing the sale price of their products. These traditional quality practices not only caused drops in competiveness and market share, but they also resulted in defective products being shipped to the customers.

The purpose of this study was to use the scientific approach of continuous quality improvement by demonstrating the application of Statistical Process Control (SPC) tools to a real case. The printer studied in this case was the Department of University Printing Services at a major mid-western university in the United States (indicated as *University Printing Services* for the rest of the paper).

Statement of the Problem

The University Printing Services is faced with the problem of rising costs associated with the waste resulting from press re-runs.

Issue Statement

The goal was to reduce paper waste due to press errors during the printing process in the University Printing Service by applying Statistical Process Control (SPC) tools.

Objectives

There were ten offset lithographic presses running in the University Printing Services during the period of this study. Therefore, these ten presses were the subjects of the study.

The objectives of the study were to:

- Identify the most critical press—that which had the largest amount of *paper waste per impression.*
- Investigate all possible causes associated with the most critical press and identify the root cause.
- Develop a Moving Range (MR) control chart and an individual control chart for the future operation.

Methodology

Stage One

The first stage was to identify the press on which re-runs occured most frequently.

Stage Two

The second stage was twofold: 1) To analyze available press-related data and study causes of re-runs among various printing presses; and 2) To identify the root cause of the press where the re-runs occured most frequently.

Stage Three

The third stage was to study the available data related to the root cause identified in Stage Two and to construct a proper control chart for the future operation of University Printing Services.

Model of Continuous Quality Improvement (CQI)

A CQI model, adapted from the Total Quality Management (TQM) training program offered by Oregon State University, is displayed in Figure 1. The model served as a step-by-step guide for this project.

Analysis

Data Collection

The author met with the operating personnel at University Printing Services and collected data on all ten printing presses. Data included the amount of paper waste, causes of re-runs, number of impressions, and supplemental information for each month. Lists of data, including twelve months of re-run logs (from June 1, 1997 to May 31, 1998), were provided by the University Printing Services. In addition, a record that contained the total cost by operation for each applicable month was analyzed. Finally, a re-run log that recorded the total operation cost associated with paper waste for each press—and reasons for that waste on a daily basis—was also studied. Using those data, a ratio of the amount of paper waste per impression (amount of paper waste/number of impressions) by individual press was computed for each month. These ratios are displayed in Appendix 1 through Appendix 12. The ratio was computed to standardize the operating time length among printing presses. The operating time length varied greatly among presses; therefore, an accurate comparison could not be made. A summary chart of the ratios is shown in Figure 2.

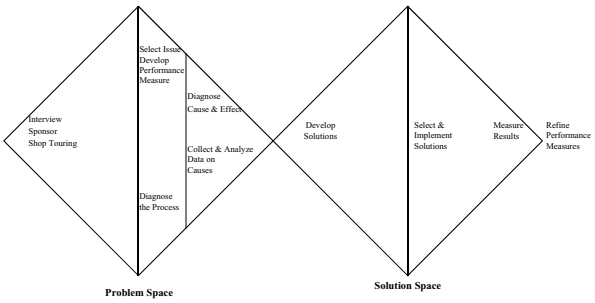
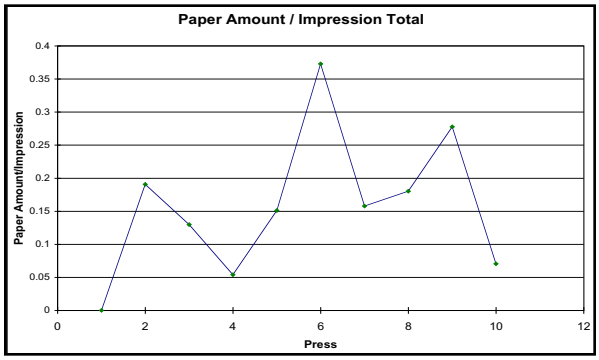


Figure 1. Continuous Quality Improvement Model

Data Analysis

A Pareto chart of paper waste amount per impression for the ten presses was constructed for the purpose of determining the most problematic

PRESS	1	2	3	4	5	6	7	8	9	10
June	0	0	0.00972	0.00215	0.00468	0.01223	0.01287	0.00792	0.00151	0.00115
July	0	0	0.01281	0	0.01213	0.06179	0.01076	0.03751	0.01176	0
August	0	0	0.00351	0.00476	0.00249	0.00691	0.0169	0.01485	0.03215	0.04449
Sept	0	0.0121	0	0	0.00886	0.01108	0.00929	0.03591	0.10461	0
Oct	0	0.01369	0	0.00313	0.01547	0.09287	0.00595	0.01405	0.00703	0.00537
Nov	0	0.03775	0	0.01918	0.00333	0.03083	0.02272	0.00755	0.02252	0
Dec	0	0.02627	0	0	0.0059	0.02924	0.01715	0.00249	0.00889	0
Jan	0	0.02901	0	0.0058	0.01415	0.01481	0.00795	0.0097	0.02033	0.00985
Feb	0	0.01285	0	0.01197	0.02474	0.01227	0.00896	0.00472	0.02781	0.00037
March	0	0.03534	0.0011	0.00252	0.0078	0.04069	0.00714	0.02963	0.02924	0.00662
April	0	0.0163	0.10246	0.00322	0.02444	0.02337	0.02733	0.01359	0.00804	0.0027
May	0	0.00719	0	0.00123	0.02705	0.03664	0.01083	0.00228	0.00365	0
Total	0	0.1905	0.1296	0.05396	0.15104	0.37273	0.15785	0.1802	0.27754	0.07055



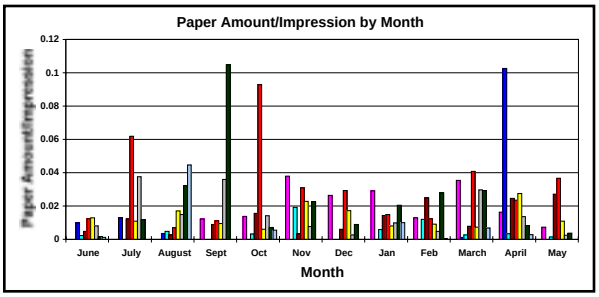


Figure 2. Summary Chart for the Ratio of Paper Waste Amount per Impression

Press	Total
6	0.37273
9	0.27754
2	0.19050
8	0.18020
7	0.15785
5	0.15104
3	0.12960
10	0.07055
4	0.05396
1	0.00000

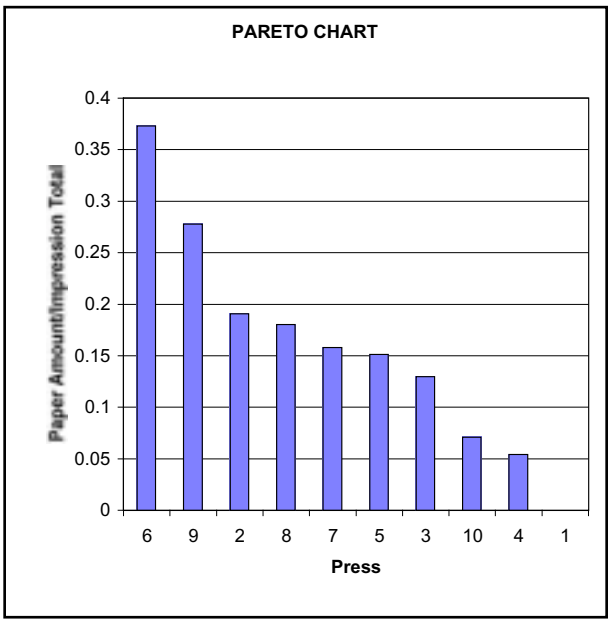


Figure 3. Pareto Chart of Paper Waste Amount per Impression for the Ten Presses

press (see Figure 3). By examining the Pareto chart, press six was identified to be the most critical press (the longest leg of the Pareto). It accounted for about 37.3 % of all paper waste. A review of the data and a discussion with the managers of the University Printing Services revealed no confounding data. Therefore, it was decided to construct a control chart to diagnose and monitor the process.

Considering that the ratio used to make the comparison is a monthly average, the sample would be treated as one unit, that is, n=1. In such situations, the control chart for individual units is useful. The control procedure uses the moving range (MR) of two successive months to estimate the process variability (Asaka & Ozeki, 1990). A

	MR_i	MR_{bar}	UCL	LCL	X_{bar}
JUN	---	0.03	0.098	0	0.0122
JUL	0.04956	0.03	0.098	0	0.0618
AUG	0.05488	0.03	0.098	0	0.0069
SEP	0.00417	0.03	0.098	0	0.0111
OCT	0.08179	0.03	0.098	0	0.0929
NOV	0.06204	0.03	0.098	0	0.0308
DEC	0.00159	0.03	0.098	0	0.0292
JAN	0.01443	0.03	0.098	0	0.0148
FEB	0.00254	0.03	0.098	0	0.0123
MAR	0.02842	0.03	0.098	0	0.0407
APR	0.01732	0.03	0.098	0	0.0234
MAY	0.01327	0.03	0.098	0	0.0366
TOTAL	0.33001				0.3727
Average	0.03000				0.0311

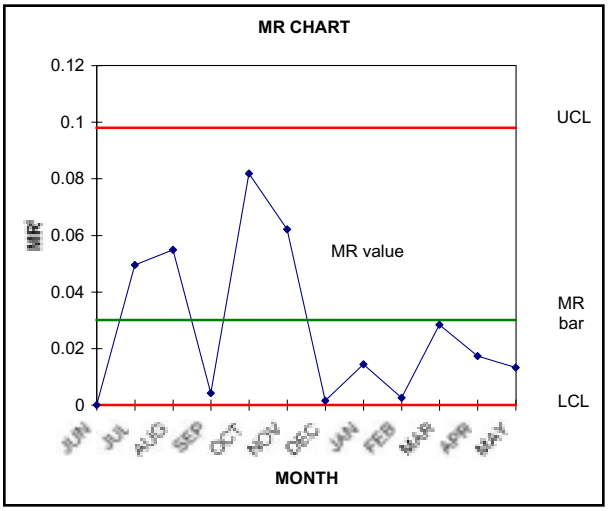


Figure 4. Moving Range of Two Successive Months to Estimate the Process Variability

table of moving range and its MR chart are exhibited in Figure 4. The MR control chart demonstrates a non-random, non-cyclical pattern. It also shows that there are no outliers. The MR chart indicates that the process was in control. Since the process was in control, an individual control chart was constructed based on the information obtained from the MR chart (Juran & Gryan, 1988). The control chart used to depict the variability of individual measurements by month is displayed in Figure 5. The data illustrated in Figure 5 are non-random and non-cyclical, and there are no outliers. Therefore, the it was concluded that the current printing operation in the University Printing Services is in control by applying a six-sigma control limit.

Although the control charts indicated the process was in control for press six based on the six-sigma control limit, there was excessive variability around the mean value. This requires further investigation on the sources of variability. In this study, this also means further investigation on

Month	X bar	UCL	LCL	X double bar
JUL	0.0618	0.111	0	0.0311
AUG	0.0069	0.111	0	0.0311
SEP	0.0111	0.111	0	0.0311
OCT	0.0929	0.111	0	0.0311
NOV	0.0308	0.111	0	0.0311
DEC	0.0292	0.111	0	0.0311
JAN	0.0148	0.111	0	0.0311
FEB	0.0123	0.111	0	0.0311
MAR	0.0407	0.111	0	0.0311
APR	0.0234	0.111	0	0.0311
MAY	0.0366	0.111	0	0.0311
Total	**0.3727**			
Average	**0.0311**			

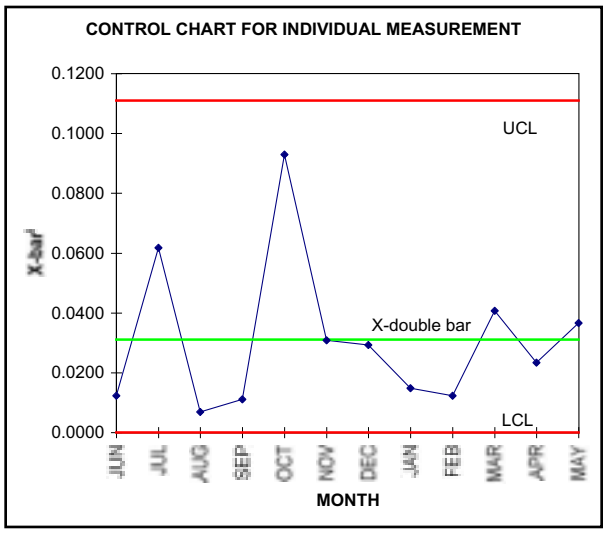


Figure 5. Control Chart for Individual Measurement

all possible causes of the paper waste for press six is necessary. According to the project team of University Printing Services, a detailed flow chart of the printing process was constructed in Figure 6. The purpose of the flow chart was to identify the sequence or steps within the printing process. In particular, the detailed flow chart illustrates the action or decision-making steps of the process and may also show the person doing the work or making the decision. In the detailed flow chart, diamonds symbolize "decision making," boxes denote "task," and ovals represent "start/end process" (Gelina, 1997).

Next, a cause-and-effect diagram (also known as fishbone diagram), shown in Figure 7, was constructed to analyze the possible causes associated with the paper waste. The purpose of the fishbone diagram was to identify the relationship between the problem (paper waste) and causes of that problem. Note that the Pareto diagram, which is shown in Figure 3, identified the effect (problem) element: paper waste on press six. The longest leg of the Pareto becomes the effect (or the problem) for the cause and effect diagram. Generally speaking, the factors investigated as possible causes are the five input elements for all processes. As shown in Figure 7, these factors are identified as person, machine, method, material, or environment (Gelina, 1997). Each leg of the fishbone diagram is built upon one of the five factors. The project team completed the construction of the Cause and Effect Diagram, and the procedure used to complete the diagram is listed below.

1. Determine the element on the Pareto diagram to be placed in the position of effect—the longest leg—on the Cause and Effect Diagram.
2. Identify the five major causes for problems and place them on the Cause and Effect Diagram.
3. Identify primary causes under each of the major cause headings.
4. Identify secondary causes under each of the primary causes.
5. Utilizing the grouping process of multi-voting, determine the cause that has the greatest impact upon the problem or effect.
6. Determine how to measure the chosen cause factor.

All possible causes were summarized into eleven categories and shown in Figure 8. Figure 8 also exhibits the explanation for each category of causes. Figure 9 reveals the frequencies of each type of cause shown in Figure 8 by month for press six. As shown in Figure 9, the most influential cause of re-runs for press six was Toning or Scumming (accounted for 42.6 % of all problem occurrence, i.e., 40 / 94 = 0.4255).

Results, Conclusions, and Recommendations

Results

The author worked closely with the project team from University Printing Services to explore the critical problem of paper waste resulting from the error. The purpose of the study was to identify the most problematic press, in terms of the amount of paper waste, and the major causes for the paper waste. The results of analyzing the data containing twelve months of re-run logs (from

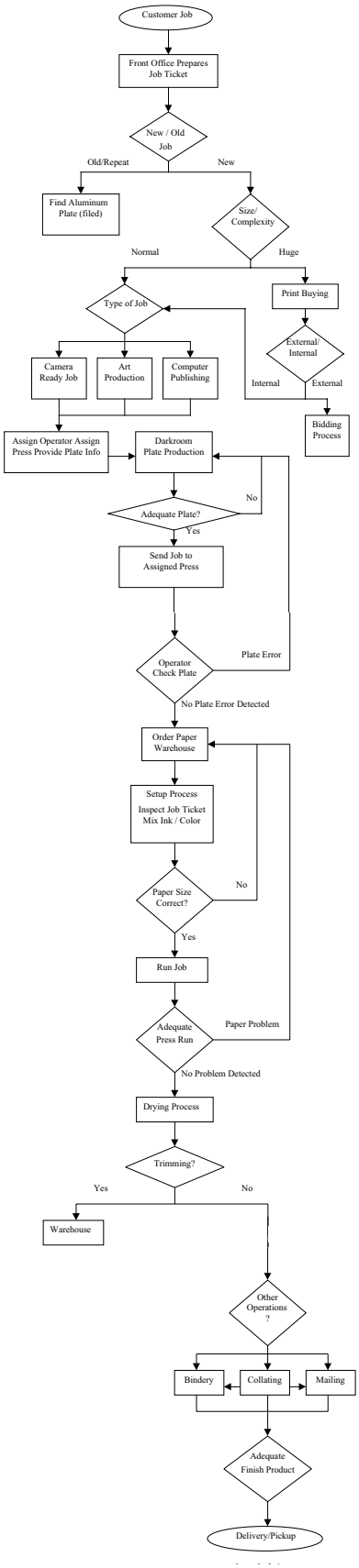


Figure 6. Printing Services Process Flowchart

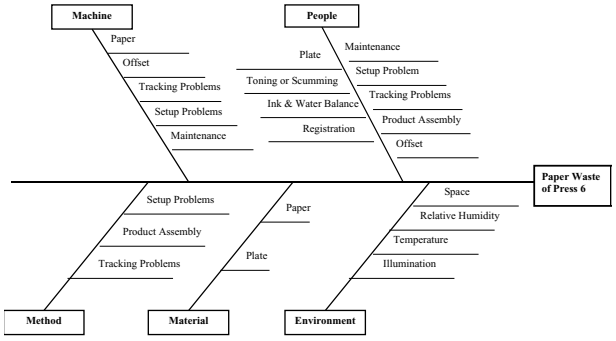


Figure 7. Cause and Effect Diagram for the Paper Waste of Press 6

June 1, 1997 to May 31, 1998) show:

1. The printing process of the University Printing Service was in control by applying six-sigma control limit, based on the analyses of the moving rang (MR) and individual control charts for Press Six.
2. Press Six was identified as the most critical press, based on the process diagnoses utilizing SPC (statistical process control) tools.
3. The most influential cause of the paper waste of the press was toning or scumming.

Cause Category	Code	Description
Toning or Scumming	**(1)**	Too little water
Tracking Problem	**(2)**	Related to cleaning of roller (whether setup or not, are the rollers being changed or cleaned after each job?), or is the color of the ink too dark which cases smearing on feeding.
Ink and Water Balance	**(3)**	Too much water or ink - color match problem due to basis on operator judgment.
Plate	**(4)**	Related to errors on plate. Due to: image typeset or artwork; either employee or customer error, bad plate reproduction, wrong plate used, creased plate.
Registration	**(5)**	Related to alignment of text on printed matter. Due to: plate alignment, paper curling, color pickup, and layout.
Paper	**(6)**	Related quality, size, thickness as related to machine. Types include: hickeys (due to grits or lumps in paper or holes in paper), curling (due to improper thickness), wrinkling of no carbon required (ncr) paper (due to feeder pressure), mis-feed on sheet machines (due to feeder problems).
Product Assembly	**(7)**	Related to output of final product. Types include: backed wrong, collated wrong, cut wrong paper size or use wrong paper, folding not per customer satisfaction, misplacement of punching holes, mailing problems.
Offset	**(8)**	Related to excessive ink, excessive stackings (pressure), and too much color, lack of powder.
Others	**(9)**	Job ticket error, customer error, bad envelops, unknowns, atmosphere problems.
Setup Problems	**(10)**	Related to change from one job to another. e.g. plate changes, ink changes, paper changes, adjustments, etc.
Maintenance	**(11)**	Calibration or lack of timely maintenance, equipment problems, press trouble, press check while servicing.

Figure 8. Possible Causes of Paper Waste for the Press

Cause (code)/Month	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	TOTAL
Toning or Scumming (1)	4	3	2	3	3	1	5	2	3	4	4	6	**40**
Tracking Problem (2)	0	2	2	0	2	1	0	2	0	0	2	0	**11**
Ink & Water balance (3)	1	1	1	2	1	1	0	0	1	0	0	1	**9**
Plates (4)	1	0	0	0	2	2	0	0	1	1	2	0	**9**
Registration (5)	0	1	0	0	0	0	0	0	0	2	1	3	**7**
Paper (6)	2	1	0	0	0	1	0	0	0	1	1	0	**6**
Product Assembly (7)	0	1	0	1	1	1	0	1	0	1	0	0	**6**
Offset (8)	0	0	1	0	0	0	0	0	0	0	0	1	**2**
Others (9)	0	0	0	0	1	0	0	1	0	0	0	0	**2**
Setup Problems (10)	0	0	0	0	0	0	1	0	0	0	0	0	**1**
Maintenance (11)	0	1	0	0	0	0	0	0	0	0	0	0	**1**

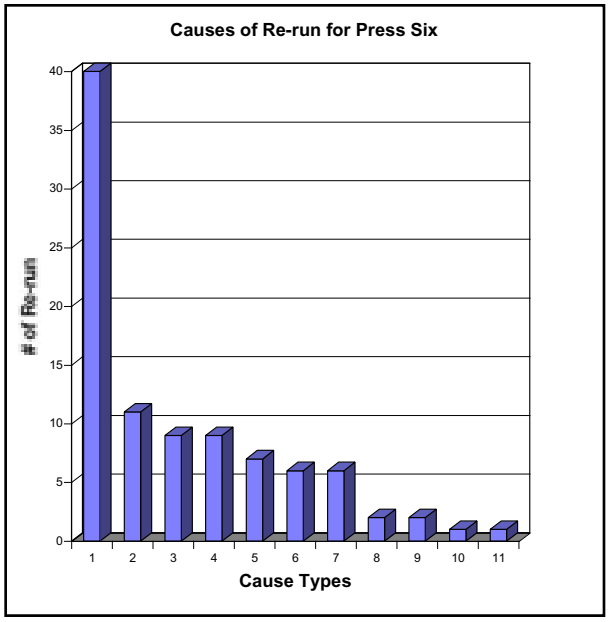


Figure 9. Causes of Re-run for Press Six

Recommendations

Although the press operation process was in statistical control at University Printing Services, there still is room for reduction in process variability. To improve performance, it will be necessary to reduce variability. The experimental design may offer a more effective way to do this than Statistical Process Control (SPC). During this project, SPC tools, such as the Histogram, Pareto Chart, Fishbone Diagram, Flow Chart, and Control Chart, were applied to diagnose the press operation process. However, SPC is a passive statistical method: one watches the process and waits for some information that will lead to a useful change. In this study, the process was in control, so passive observation may not provide much useful information. On the other hand, experimental design is an active statistical approach: one can actually perform a series of tests on the process by making changes in the inputs and observing the corresponding changes in the outputs (Montgomery, 1997). This will provide significant information that could lead to process improvement.

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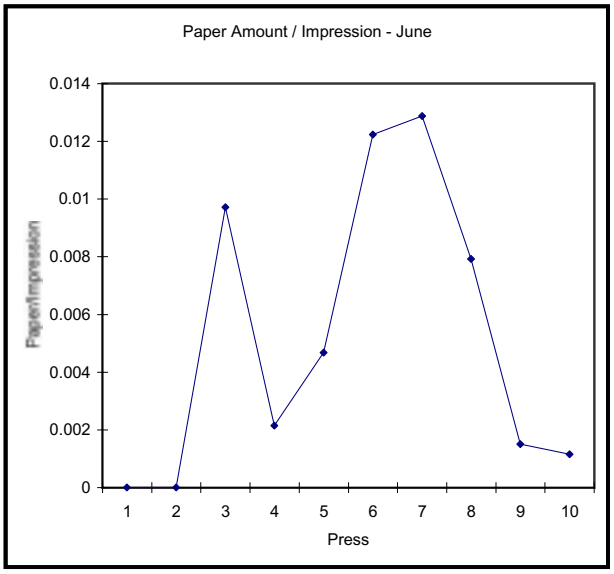
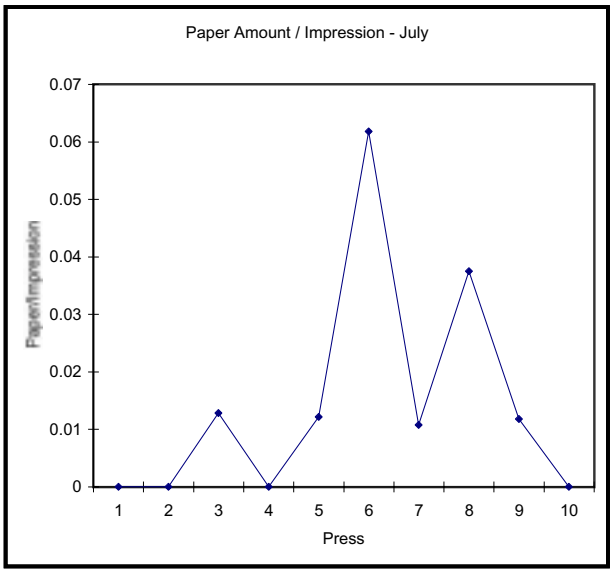
APPENDIX 1				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
JUNE	1	0	900900	0
JUNE	2	0	0	0
JUNE	3	4380	450830	0.009715414
JUNE	4	750	349300	0.002147151
JUNE	5	2090	446679	0.004678975
JUNE	6	2750	224855	0.012230104
JUNE	7	5600	435000	0.012873563
JUNE	8	3050	384975	0.007922592
JUNE	9	1200	796700	0.001506213
JUNE	10	300	261300	0.001148106



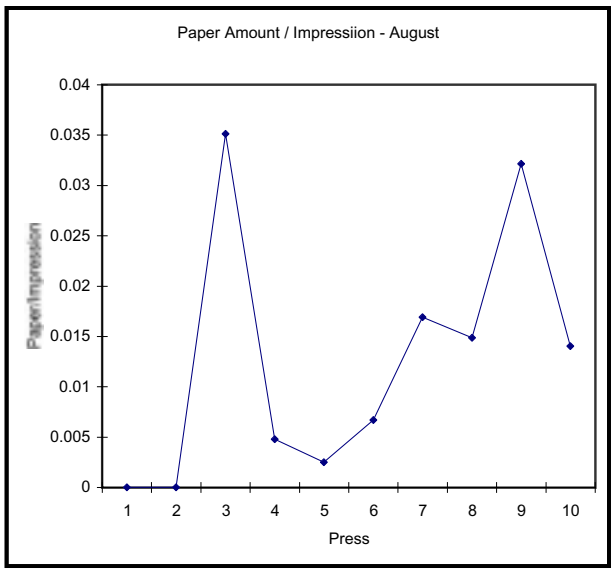
Appendix 1: June

APPENDIX 2				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
JULY	1	0	136350	0
JULY	2	0	0	0
JULY	3	2900	226310	0.012814281
JULY	4	0	192950	0
JULY	5	3900	321568	0.012128072
JULY	6	5750	93050	0.061794734
JULY	7	2250	209080	0.010761431
JULY	8	9600	255937	0.037509231
JULY	9	3300	280600	0.011760513
JULY	10	0	218300	0



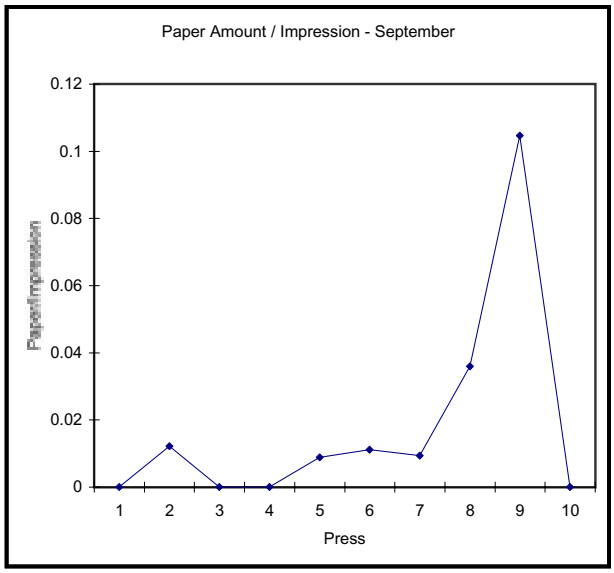
Appendix 2: July

APPENDIX 3				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER/IMPRESSIONS
AUGUST	1	0	721775	0
AUGUST	2	1500	0	0
AUGUST	3	17600	501005	0.03512939
AUGUST	4	4000	839860	0.004762699
AUGUST	5	750	301478	0.002487744
AUGUST	6	1500	224180	0.006691052
AUGUST	7	4650	275115	0.016902023
AUGUST	8	7550	508456	0.014848876
AUGUST	9	16300	507036	0.032147619
AUGUST	10	2900	206800	0.014023211



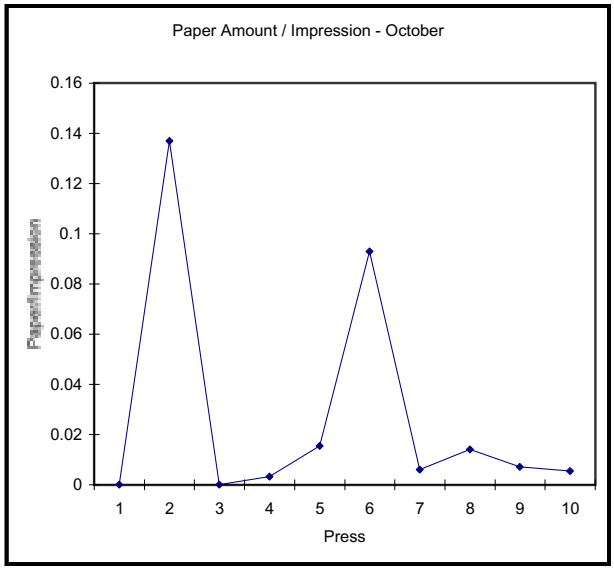
Appendix 3: August

APPENDIX 4				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
SEPTEMBER	1	0	372925	0
SEPTEMBER	2	4100	338619	0.012108003
SEPTEMBER	3	0	212025	0
SEPTEMBER	4	0	381350	0
SEPTEMBER	5	3875	437185	0.008863525
SEPTEMBER	6	3575	322495	0.011085443
SEPTEMBER	7	3100	333605	0.009292427
SEPTEMBER	8	10800	300720	0.035913807
SEPTEMBER	9	37155	355150	0.104617767
SEPTEMBER	10	0	181800	0



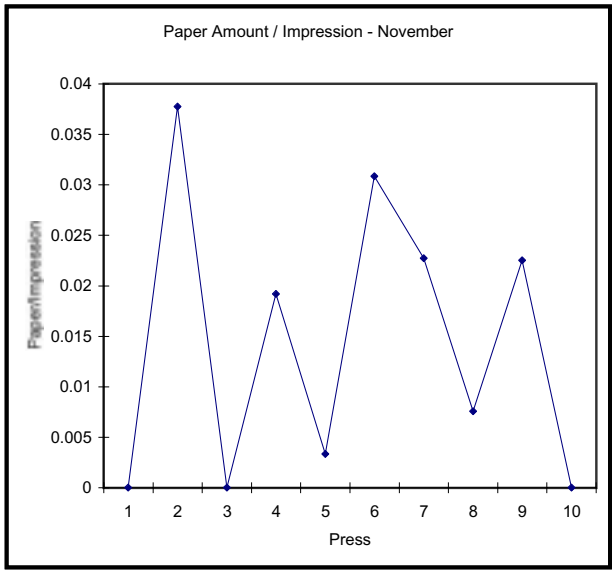
Appendix 4: September

APPENDIX 5				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
OCTOBER	1	0	216150	0
OCTOBER	2	42250	308534	0.136937906
OCTOBER	3	0	11620	0
OCTOBER	4	1000	319320	0.003131655
OCTOBER	5	3988	257778	0.015470676
OCTOBER	6	22650	243885	0.09287164
OCTOBER	7	1400	234995	0.005957574
OCTOBER	8	6300	448290	0.014053403
OCTOBER	9	3650	518700	0.007036823
OCTOBER	10	850	158000	0.005379747



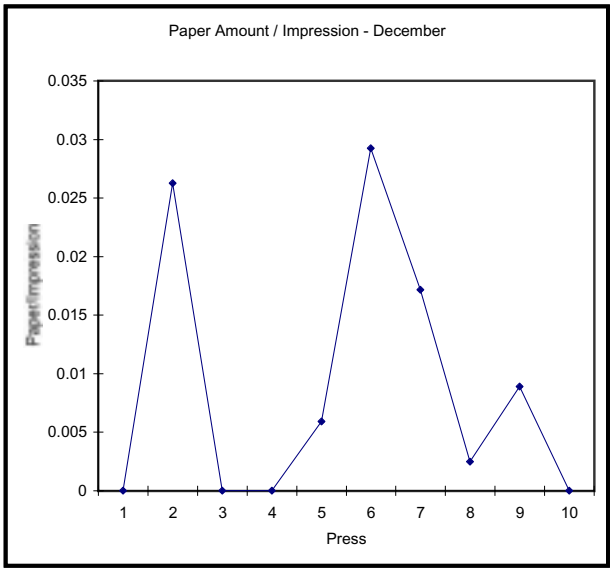
Appendix 5: October

APPENDIX 6				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSION	PAPER / IMPRESSION
NOVEMBER	1	0	489800	0
NOVEMBER	2	13115	347408	0.037751002
NOVEMBER	3	0	0	0
NOVEMBER	4	5400	281400	0.019189765
NOVEMBER	5	1000	299402	0.003339991
NOVEMBER	6	5400	175153	0.030830188
NOVEMBER	7	3750	165000	0.022727273
NOVEMBER	8	2950	390590	0.007552677
NOVEMBER	9	4950	219730	0.022527648
NOVEMBER	10	0	164850	0



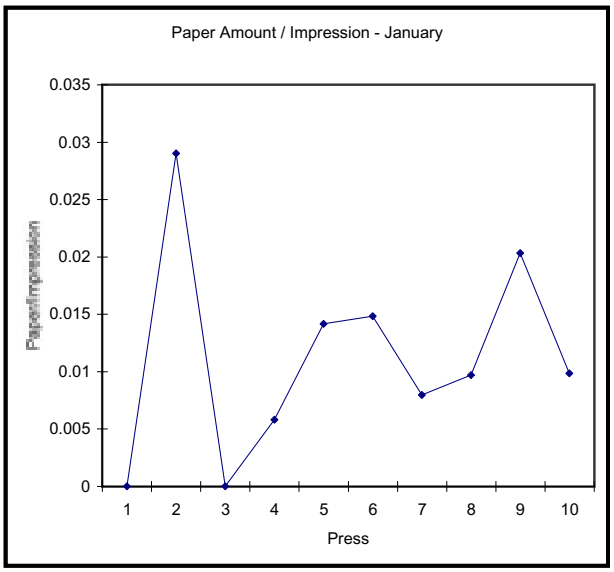
Appendix 6: November

APPENDIX 7				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
DECEMBER	1	0	40000	0
DECEMBER	2	4535	172615	0.02627234
DECEMBER	3	0	130	0
DECEMBER	4	0	464500	0
DECEMBER	5	1650	279315	0.005907309
DECEMBER	6	3515	120200	0.029242928
DECEMBER	7	2850	166110	0.017157305
DECEMBER	8	900	361430	0.002490109
DECEMBER	9	3400	382250	0.008894702
DECEMBER	10	0	202600	0



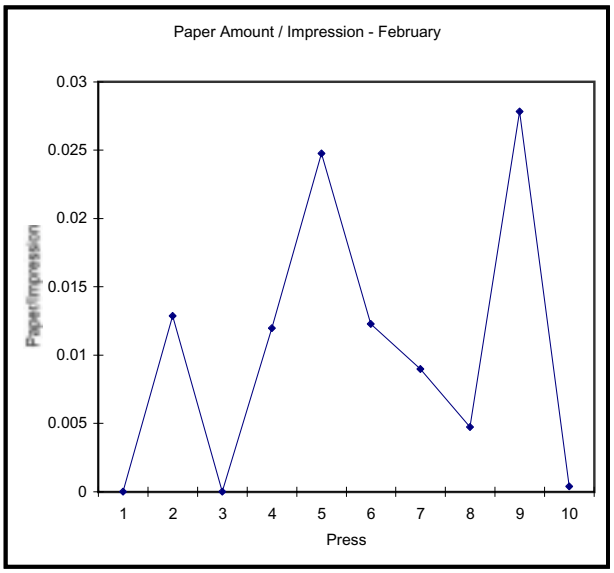
Appendix 7: December

APPENDIX 8				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER/IMPRESSIONS
JANUARY	1	0	448800	0
JANUARY	2	10500	361825	0.029019554
JANUARY	3	0	260	0
JANUARY	4	1000	172200	0.005807201
JANUARY	5	3490	246555	0.014155057
JANUARY	6	3200	216016	0.014813718
JANUARY	7	1200	150829	0.00795603
JANUARY	8	2400	247410	0.009700497
JANUARY	9	8150	400862	0.020331186
JANUARY	10	1850	187695	0.009856416



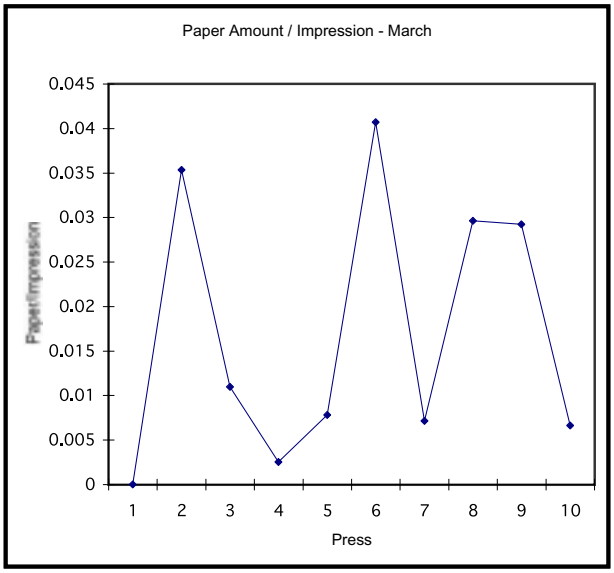
Appendix 8: January

APPENDIX 9				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
FEBRUARY	1	0	298770	0
FEBRUARY	2	2750	213939	0.012854131
FEBRUARY	3	0	6615	0
FEBRUARY	4	3000	250600	0.011971269
FEBRUARY	5	8475	342465	0.024747054
FEBRUARY	6	2480	202000	0.012277228
FEBRUARY	7	3450	384725	0.008967444
FEBRUARY	8	2550	539200	0.004729228
FEBRUARY	9	8625	310100	0.027813609
FEBRUARY	10	100	264900	0.000377501



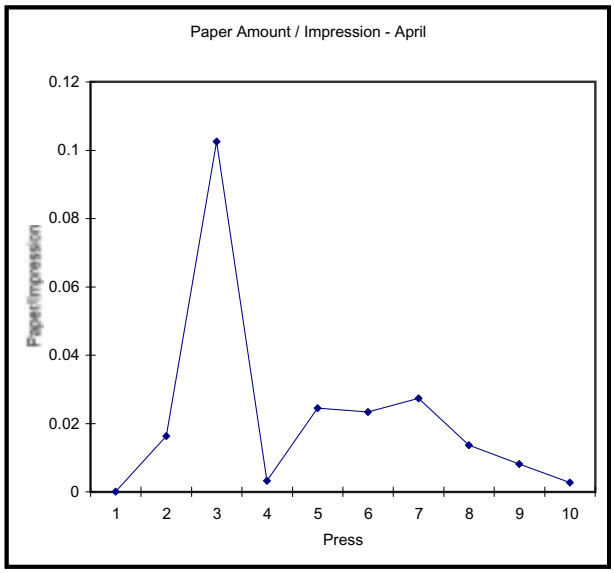
Appendix 9: February

APPENDIX 10				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
MARCH	1	0	334800	0
MARCH	2	20440	578391	0.035339416
MARCH	3	1000	91065	0.010981167
MARCH	4	1500	594585	0.002522768
MARCH	5	3000	384380	0.007804777
MARCH	6	7530	185050	0.040691705
MARCH	7	1925	269785	0.007135311
MARCH	8	16000	539920	0.02963402
MARCH	9	17970	614500	0.029243287
MARCH	10	2200	332300	0.006620524



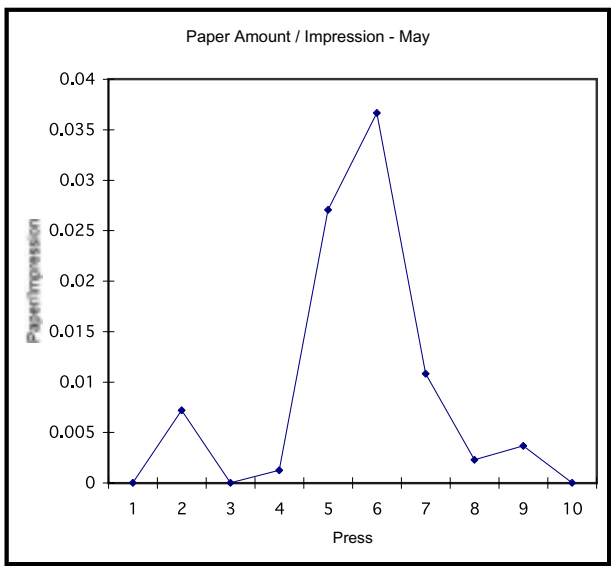
Appendix 10: March

APPENDIX 11				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
APRIL	1	0	296520	0
APRIL	2	6090	373713	0.016295928
APRIL	3	5940	57975	0.102457956
APRIL	4	1250	388540	0.003217172
APRIL	5	6837	279698	0.024444222
APRIL	6	5200	222540	0.023366586
APRIL	7	2650	96970	0.02732804
APRIL	8	3900	287020	0.013587903
APRIL	9	3200	397891	0.008042404
APRIL	10	500	185250	0.002699055



Appendix 11: April

APPENDIX 12				
MONTH	PRESS	PAPER AMOUNT	# OF IMPRESSIONS	PAPER / IMPRESSIONS
MAY	1	0	100875	0
MAY	2	2845	395850	0.007187066
MAY	3	0	36436	0
MAY	4	500	405150	0.001234111
MAY	5	7850	290153	0.027054692
MAY	6	7450	203330	0.036639945
MAY	7	2300	212400	0.010828625
MAY	8	1050	459890	0.002283155
MAY	9	2250	615850	0.003653487
MAY	10	0	173300	0



Appendix 12: May

Visual Readability in Instructional Images

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Instructional Technology and Telecommunications
Western Illinois University

Skill in graphic design may be defined as having a special awareness of the basic forms in which the eye has the greatest attraction. Graphic designers must also have the ability to apply these principles to the organization of visual elements into a composition. Most of us are aware of the abstract shapes and forms to which we are attracted. For those who consider themselves artistically unskilled, it can be a small leap to consider how these elements of attraction can be used in ways to communicate to other people. Once this leap is taken, many people find that what they considered part of their personality or preferences and tastes is actually what others consider artistic talent.

Most of us have the ability to communicate visually, but, like learning any foreign language, it takes time and effort. Some will have a fast basic facility at learning visual concepts, but most others have the capability to learn if time and effort are given. One good example is the phrase, "I don't know what I am looking for but I will know it when I see it." The first step to proficiency in graphic design is the ability to describe what we favor about a particular visual and why. Once we can describe what makes a particular visual successful to us, we can apply this knowledge to the design of completely new visuals. The development of such an individual artistic style is not often an instantaneous process. It is most often arrived at through long-term production of a consistent body of work. The second step to proficiency in producing instructional graphics is to link effective graphic design to the instructional objective of an image and the readability of a visual to the level of instruction.

This paper reports on a pilot study I used to define for myself and my students what "good design" means and how it may be assessed in relation to instructional objectives.

Visual Language

An alphabet of visual forms is derived from those characteristics to which our eyes are most sensitive. The organization of these elements is considered the language of visual communication. Assuming that a particular population has normal vision, these basic forms may be considered universal if they can be removed from any visual context and still have meaning. Without making reference to any particular line, or without specifying any characteristics used to describe lines, they may be said to either point or lead the eye. The line can be considered a letter in the visual alphabet because it is used in combination with other visual elements to construct completely different meanings. Lines have characteristics that we can see as a consequence of cortical cells in our brain especially dedicated to detect lines. These sensitivities were discovered through brain hemisphere specialization research (Lennie, 1980) and were initially described by Gestalt psychologists (Wertheimer, 1958).

Among students with normal visual acuity, it is reasonably safe to assume that the mechanism of basic visual intake is the same. It is not safe to assume what meaning students will attach, if any, to a particular visual element once it is perceived. If a particular bit of visual information happens to pass from short-term to long-term memory, this is dependent upon a particular student's prior knowledge and mental structures. Some effort must be invested in studying the intended audience of the visual communication. Psychologists have used response tests to basic visual elements such as line, shape, form, and pattern for many years to determine what is on a patient's mind. For example, a horizontal line can symbolize a horizon, a rung of a ladder, or practically anything, depending on what happens to be on a person's mind.

Much of what we see is also dependent on cultural characteristics. Anthropologists have found that people from villages which are constructed from round shapes have a hard time recognizing and attaching significance to geometric form. These people have the facility to see geometric form, but, since it has little to do with significant objects in their culture, it has little meaning. We may say that the visual alphabet of most people is quite similar, although they use these elements in completely different combinations in order to suit their particular culture and environment. An often-cited study, used to refute the idea that visual literacy must be learned, is that of Hochberg and Brooks (1962). They prevented their daughter from viewing as many images as possible from birth to age two and found that "she was able to recognize both photographs and line drawings" (p. 625). Do humans have all the visual literacy they will ever possess built-in at birth? Studies of different cultures support the conclusion that students do learn to perceive their environments differently. Visual literacy is the sum of past experience and not built-in (Mangan, 1978, p. 245). Visually literate people "internalize specific coding systems of a medium and apply them as tools of thought" (Salomon, 1978, p. 38).

Common assumptions implied by the visual language concept include:

1. A set of basic visual elements can be combined to form completely different images.
2. Composition is based on order.
3. Images are either completed by captioning or may rely on more arbitrary individual interpretation.
4. Learning to read into visuals does not happen as a consequence of incidental exposure to media but through direct and purposeful study of individual images.
5. Much of intended visual communication or self expression is not perceived, or often misunderstood, especially if it is complex. The accuracy of communication is increased in visuals that are accompanied by text.

Visual Perception

Our eyes can focus on one central point of very sharp definition corresponding to a high concentration of rods and cones in the eye. This area of maximum sensitivity is brought to bear on subject detail by rapid scanning and numerous extremely brief fixations. These scanning and fixating actions are called secedes. As you read the text in this journal, you are fixating rapidly on each letter of each word. With the aid of peripheral vision you are aware of surroundings, but your area of highest visual definition is following the letters in this sentence. In visual research the path of these secedes are tracked, counted, and timed in order to unpack the dynamic structures in an image and determine its effectiveness in capturing and holding attention. If the subject is placed off center, it is considered more successful in eye movement research because viewers spend more time scanning the image to discover the subject and ground relationship. Static image placement in the center of the frame is considered less successful because less eye movement is invited by the image. With centrally placed subjects, the eye fixates quicker on the subject and there is a more rapid loss of interest. When the subject is placed in the exact center of the frame, it gives the eye less of a chance to explore. Usually, the longer the eye explores an image the more it is considered a success because there is a greater potential for the viewer to gather more information from the image.

Logos and other simple graphics, such as warning signs or international symbols, are usually central or symmetrical in design because of their intention to be rapidly reviewed and recognized. Another example, where central placement is effective, is with images designed to shock or confront the viewer. One of the controversies regarding visuals is whether they should always be artistically pleasing. Sometimes the purpose of imagery is to make viewers aware of unjustness such as war or famine. In these instances, the central placement of stricken subjects directly confronts or appeals to the viewer. The centrally placed image is so rapidly read that it is difficult to avoid or ignore. With the exception of these successful examples of central placement, an image which is studied for longer periods of time is considered more successful by eye movement measures. The question that should be addressed for these images is what they are successful for. In instruction, an image may be studied for a long time by the viewer and still be unsuccessful. This is because it may

be leading the viewer's thoughts away from the intended objective of the image and to some unrelated emotion or personal recollection.

Readability of Visuals

To access how a visual is perceived by a viewer, educators have devised visual readability measures. These measures attempt to compare the objective of an image to what was perceived by the viewer. The degree of correlation between the instructional objective and interpretation by the student defines the readability of an instructional image. In assessing the readability of instructional imagery, a scene is considered a visual sentence composed of individual elements that build until the viewer reaches the conclusion of the scene. One example of visual readability research design was the evaluation of 30 textbook photographs, 15 each from two editions of similar competing best-selling photography textbooks (Upton, 1989; Davis, 1990). The purpose of the pilot test was to determine the readability of photographs for specific learners and learning situations. In the pilot test, half of the 30 participants evaluated 15 photographs randomly chosen from one text and the other half evaluated 15 photographs from a competing text. Every viewer completed an affective and cognitive questionnaire for one photograph, taking approximately 20–30 minutes each (158 questions). These questions were developed from the instructional objectives for specific photos which were found in the caption and related text. In addition to these caption/objective specific questions, general visual design questions were developed. The major question categories follow later in this paper. This pilot study was meant to provide a preliminary application for a readability instrument (Lantz, 1996).

Basic Visual Readability Instrument Design

Phase I

Brief duration exposure to visual: Designed to record information retained in short term memory and determine affective or preference reaction to the image.

1. Allowing individual students to briefly view a randomly selected image (.5 second display).
2. Directing students to draw major visual elements from memory.
3. Questioning to determine emotional or affective response to the brief glance.
4. Determining if students have a visual preference (like or dislike) response.
5. Relating question responses to original images using the visual semiotic method (Saint-Martin, 1990).

Phase II

Extended duration exposure to visual: Designed to record information retained in longer term memory.

1. Providing prolonged exposure to photo and caption. (Five minutes to complete questions).
2. Questioning to provide a description of the image detail in longer term memory.
3. Questioning to discover the success of the image based on its caption or instructional objective.
4. Relating question responses to original images using the visual semiotic method. An example of this type of data analysis drawing is provided in Figure 13 and Figure 14 later in this paper.

In this readability instrument, visual perception is separated into two types. One type of perception is associated with the first glance given to an image. The first eye fixations in the perceptual process last less than one second. This short duration phase is also termed a perceptual filter or the mechanism of attention. Design principles, the basic mechanisms of perception and visual preferences, are most important in first glance reactions because they determine what attracts the eye in a scene. First glance reactions to images in textbooks and other printed media are critical because they determine how long and in what way an image will be further studied. The second type of perception is the viewer's response to what is perceived in relation to the caption or instructional objective of the image. Subsequent reasoning after the first glance usually results in a decision as to the significance of the image (Figure 1). Five to ten ques-

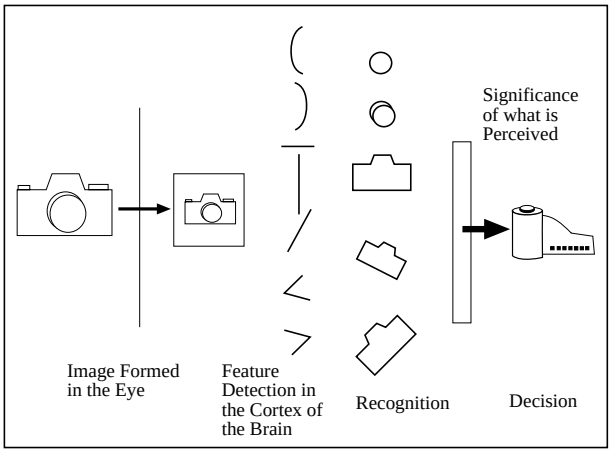

Figure 1. Basic steps of visual information processing

tions were written for each of the categories that follow.

Levels of first-glance emotional responses to imagery

This phase ends with dislike or indifference—which effectively blocks any further analysis of the image—or with a positive response.

1. Awareness of basic form.
2. Willingness to study the image.
3. Interest in further studying other material accompanying the image.
4. Surmising why the image was created or how it was used.
5. Determining the personal value or merit of the image.

The second phase of processing is influenced by the context of the image, which is often provided by a caption. Educators depend upon cognitive structures in the second phase of processing to function in a predictable manner because they ensure that different students can learn the same material. Extended study of images result in the formation of mental structures or schemata that organize information. This process is affected by the viewer's previous experiences regarding similar images. Thus students from different cultures or with different basic experiences are at a disadvantage when instructional designers assume an exclusively Western visual context. Five to ten questions were written for each of the categories that follow.

Levels of Prolonged or Caption-Directed Study of Imagery

The caption will either focus student attention toward the instructional objective of the image or in some cases distract from it.

1. Determining how the caption does or does not relate to the image.
2. Discovering relationships which inspired visual interest.
3. Linking visual and verbal elements.
4. Deciding if the image is accomplishing its objective as defined in its caption.

Compositional Guidelines

The main results of this small picture readability pilot study have served to describe and clarify the "basic design or gestalt checklist" presented in the next section of this paper. The main gist of these results is that initial perception is attracted to simplicity and order. If we did not have a means of screening out excess detail from the visual field, we would be in a constant state of information overload.

The principle of the gestalt conceives the eye as a mechanism of selection that seeks to simplify a complex scene. The eye groups visual elements into gestalts which are the first means to organize visual elements into recognizable form. Examples of gestalts include the separation of subjects from the ground they are resting on, the grouping of similar and adjacent objects, detection of regular or symmetrical shapes, effect of angle of view, detection of overlapping objects, and the decrease or increase of subject detail as an indicator of depth in the visual field.

Visual composition is often unsuccessful if it interferes with the proper functioning of gestalts. If there is no clear cut separation of the subject from its background, the subject is hard to recognize. Camouflage works on the principle of obscuring the separation of the subject from its ground. If the form of one subject interferes with, instead of overlapping with, that of another, this may be said to be a merger, as in Figure 2. Mergers are often not apparent in the camera viewfinder because the photographer focuses all attention on the subject without considering its separation or inappropriate connection with back-

ground objects. Common and embarrassing examples of mergers include telephone poles or tree branches which appear to be growing out of the subject's head.

If the shape of an object is random or unbalanced, it is also hard to separate from the background (Figure 3). If objects are not similar, they will be briefly isolated by the eye and then have a tendency to blend into the background if sufficient contrast does not exist. Objects further back in a composition are expected to have less detail and texture as a consequence of the atmospheric effects of nature, whether a scene is shot outdoors or not.

The principles of continuation and closure dictate that when the shape of one object is obscured by overlap with another subject, or cut off at the edge of the frame, we are able to imagine that the rest of the shape exists and that it comes to closure (Figure 4). Another means used to simplify our visual field is that of selective focus. Just as our eyes select on words to read, the eye can select very narrow parts of a scene on which to concentrate and exclude all other detail.

Visual Composition

If we come to recognize how the selectivity of the eye works, we can incorporate some of these principles when composing visual elements. Compositional efforts simulate the selectivity of perception. One way in which to expand awareness of gestalt rules, composition, and camera view selectivity is to use a checklist such as the following.

Figure 2. The pole sticking out of the subject's head is considered a distracting compositional merger.

Figure 3. Irregular detail can contribute to a subject merging with the background. This image is complex in detail but works well for an illustration meant to show a tree root following the terrain of a hill.

Basic Design or Gestalt Checklist

To what extent are you aware of the following characteristics as a means to help isolate subjects?

1. Shape and contour
2. Size of center of interest
3. Clarity of background
4. Position of center of interest
5. Clarity of center of interest

Figure 4. Our eyes can consider the complete shape of an object even though it is overlapped by another such as the round shape of the bowl on the lower left of this image.

Figure 5. Contrasts can be used to lead the eye such as rough and smooth (left), shiny and dull (middle), and light and dark (right).

6. Volume of center of interest
7. Weight of center of interest
8. Overall density
9. Contrasts and/or color accents (Figure 5)
10. Perspective and exaggeration of depth
11. Realistic and/or abstract interpretation (Figure 6)
12. Many points of interest
13. Subjects are clearly separated from the background
14. Subjects which are close tend to group or blend together
15. Use of vertical lines to suggest stability (Figure 7)
16. The eye is led from left to right and from top to bottom
17. Use of diagonal lines as dramatic elements (Figure 8)
18. Use of horizontal lines as restful elements (Figure 9)
19. Repeating shapes (Figure 10).
20. The center is the strongest point of attraction
21. Small spaces are emphasized
22. Large spaces recede
23. Dark or heavy objects are low in the image
24. Light areas are high in the image
25. Overlapping objects and lessening of detail suggest depth
26. High or low camera angle
27. Several of the previous design elements working in conjunction (Figure 11)

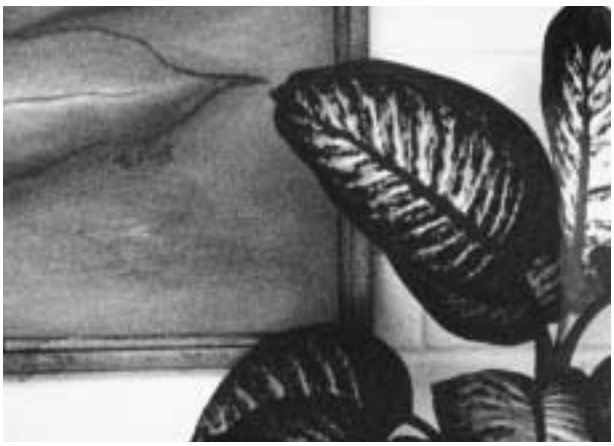

Figure 6. This composition contrasts abstract and realistic images of a leaf.

Figure 7. Vertical lines suggest stability as is evident in most architecture.

Figure 8. Diagonal lines, such as those in the gaps of the wood planks below, lead the eye and tend to provide dynamic tension in composition.

Visual Semiotic Method

One of the most promising methods for studying the readability of visual content is visual semiotics, or the study of visual language. The purpose of semiotics is to discover the visual codes, language, or grammar which operate in particular images. A full scale system of visual semiotics has been proposed by Saint-Martin (1990) and was adapted for use in representing questionnaire responses on student drawings. An example of the simple notation system used to define the visual language in images is included in Figure 12 and Figure 13.

Results and Limitations

Highly readable images were found to be more simplistic in compositional detail and low readable photographs were found to be more complex in

Figure 9. Horizontal lines, such as the horizon, are often considered restful compositional elements.

Figure 10. Repeating shapes, such as the forms in the vase and tea pot (left) and the feather (right) are used to attract the eye.

Figure 11. Several design elements such as repeating shapes, horizontal and diagonal lines, and contrast between rough and smooth were used in this composition.

Figure 12. The picture that is the basis of analysis in Figure 13.

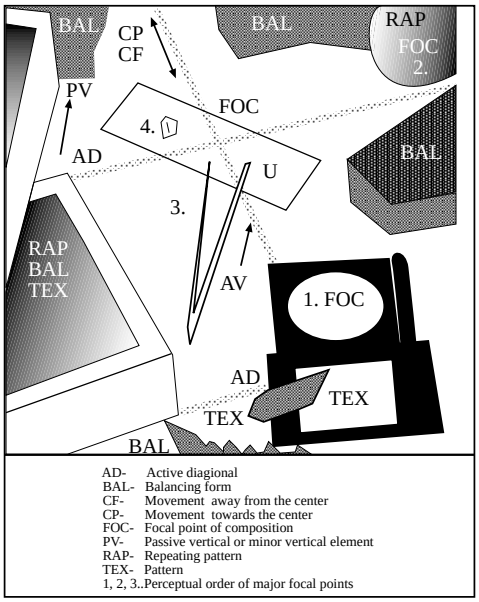

Figure 13. Visual syntax notations of composition.

the readability pilot study. This relationship between the level of detail in imagery and its readability is explored in Figure 14. Even if the conclusion that simple images are more readable could be considered completely valid and reliable, evaluators should not automatically consider images with low readability inferior to images with high readability values. This judgment should be made only

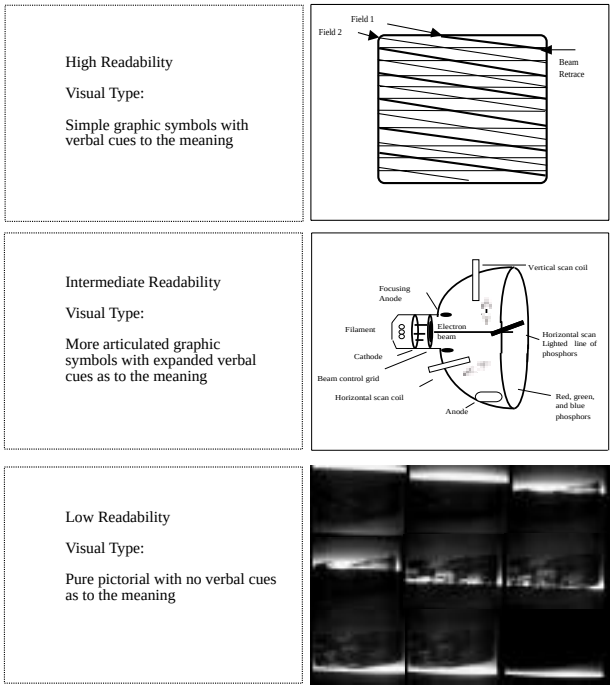

Figure 14. Three levels of realism and detail are represented in these images. The basic objective of all three illustrations is to depict, with varying levels of detail, the scanning technology used in television.

in light of the requirements an image is meant to fulfill. The more realism present in an image, the more the viewer is required to process and decipher. If the purpose of an instructional image is to stimulate creative thinking, a simplified composition that is easy to recognize is sometimes undesirable because it structures visual information too closely. Students are sometimes better served if they are left alone to discover meaning for themselves. This was found to be especially true of advanced students where the instructional objective includes learning to separate important from unimportant visual detail.

Visual language is far from becoming a universal language. Context can easily change because of individual perceptions based on where and how the imagery is presented, cultural environment, unique experiences of viewers, visual noise, bias, or many other factors. These inconsistencies pose problems to the development of a measure of visual readability. A single sequence of instructional visuals or visual alphabet cannot contain all the attributes necessary or be appropriate for all instructional objectives. There are no universally-communicable images. Rather, visuals with certain attributes, shaped by a well-drafted caption, are ideal for specific instructional goals.

Beatty (1981) defined the visually-literate method of reading visuals as a combination of skills developed by "seeing at the same time experiencing and interweaving other sensory, verbal, emotional and learning experiences" (p. 15). Arnheim (1969), a specialist in the psychology of visuals, considered "systematic training of visual sensitivity as indispensable." He further asked if educators: "...have the right to take for granted that a picture shows what it represents... how much do we know about what exactly learners see..." (p. 309). An example of an opposing viewpoint is that of Postman (1985), who suggests that visuals are so strongly associated with entertainment that they are incapable of stimulating or organizing thought toward cognitive objectives. Postman defines intelligence as the ability to "dwell comfortably without pictures in a field of concepts and generalizations." The nature of knowledge is defined by the main medium of communication that is adopted by society. Popular media formats such as books and TV are thought to develop mental structures that we build on the

rest of our lives. Thus the new generation of learners gravitate toward instruction which is most like good TV instead of a good book. Postman contends that realistic images cannot speak to the world of thought because they point away from it to the world of facts and physical matter. The facts that are illustrated in photographs, instructional TV and graphics are described by their inability to inspire conjecture, dispute or analysis.

Conclusion

Visual production facilities are expensive investments for education and training institutions. Considering this expense, why is realistic imagery considered an important resource? On a practical level, realistic visuals are what we have grown used to and expect as mass media consumers. Media which do not match up to consumer expectations can be filtered out. Visual realism provides the necessary production value expected in many visual environments. For sales purposes, higher production value is justification enough for the adoption of new technology. In advertising, medium format can take precedence over accuracy and quality of communication, and still be enormously successful in selling products. Production value is not a justifiable and fundable premise in most educational institutions and in grant proposals. For some courses or curriculum, imagery is likely to play a crucial role in the attainment of all objectives. However, in other situations, it may play an incidental role. Many educators adhere to the belief that the content of educational messages are more important than the visual appeal of the delivery medium. Unless the higher levels of visual appeal produced by imagery can be linked to student achievement, new multimedia purchases and educational programs are difficult to justify.

This paper has presented some examples of research that can be used as a starting point in the development of a visual readability instrument. Such an instrument could be used to document the effectiveness of visuals in fulfilling instructional objectives for particular learners.

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Technological Development and the Need for Training and Retraining of Printers

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Introduction

Printing technology has come a long way since its invention in China in about the seventh or eighth century A.D. Printing is known to have contributed more to the spread of civilization than any other invention, and, according to several end-of-the millennium reports, is one of civilization's greatest inventions. In particular, printing is one of our most important means of mass communications. According to Walter (1991) print is the preferred communication medium for transmitting information. In particular, Walter notes than printed images are permanent, portable, personal, and easy to use. In addition, printed documents are cheaper than other methods of communication. Here in Nigeria, printing forms the basis of our whole educational system and has, therefore, given impetus to the growth and accumulation of knowledge of our people.

Furthermore, printing has facilitated the spread of ideas that have helped to shape changes in social relations made possible by industrial development and economic transformations. There is overwhelming evidence that modern businesses depend on printing for everything from sales invoices to money to security documents. In addition, advertising also depends on printing to sell goods and services.

The printing and publishing industry is a big business and ranks high among industries in many countries of the world. In addition to books, magazines, and newspapers, thousands of other publications are printed every day for our use.

Evolution of Printing Technology

According to Asimov (1989), three fundamental advances in human communication have altered every facet of our world enormously and permanently. These are, in order of occurrence: speech, writing, and printing. Printing, as we know it today, has evolved over the years. According to Bruno (1982), printing reached its current status primarily as a result of five major developments, which include:

1. The invention of printing from movable types;
2. The invention of the Linotype typesetting machine, which did mechanically and quickly what Gutenberg and his successors had done laboriously by hand for generations;
3. The application of power to the printing press, culminating in the development of the high-speed, web-fed, multicolor rotary press;
4. The application of the camera—first to photoengraving, then to lithography (especially offset) and, via phototypesetting, to composition of type matter; and
5. The application of electronics and computers.

Computers are the fourth advance in communication

In support of the fifth development mentioned by Bruno, Asimov (1989) posited that computers are a fourth advance in communication that is every bit as important as the first three. Asimov further contends that computers will enable most human beings to be more creative than they have ever been before.

The impact of the application of computers to printing technology is still being felt and will continue to be felt for some time to come. To date, the application of computer technology to printing processes has had a profound effect on contemporary printers.

Prust et al (1989) noted that the increasing use of automated controls in operations, combined with computer or computer-assisted presses and typesetting facilities, tends to make printing less of an individual “craft” without sacrificing traditional

craftsmanship. The use of new technological developments has also brought with it a managerial revolution: less concern is now given to the particular printing process and more attention is being paid to satisfying the market for individual printed products.

The Desktop Publishing Revolution

On January 28, 1985, a dramatic change took place in the printing industry as a result of the introduction of the term and concept of desktop publishing by Aldus Corporation in the United States. According to Dressler et all (1987), four unique, and revolutionary, ideas began to take shape:

1. Publishing could be done with equipment small enough to fit on a desktop;
2. Publishing is more than just typing words onto a page. Rather, it involves a total system capable of providing, as output, pages that include graphics;
3. Non-professionals could (and would) have control over the publishing process; and
4. The system making all of this possible would be inexpensive enough for popular adoption and would be sold in retail outlets.

These four ideas, in the opinion of this writer, are enough to scare the pants off any printer who is afraid of change. However, printers should not be afraid because change is inevitable and must be expected at any time.

To Hannemann (1992), the principal result of desktop publishing technology was to separate the graphic artist from traditional hands-on prepress functions. Techniques that printers had long cherished as proof of their craft—techniques that required in-depth knowledge as well as psychomotor skills, training, and practice—were replaced by programs written for and sold to non-professionals. Having one's knowledge and skills replaced by digital code is certainly frightening, and many printers resisted change until there was no choice.

Hannemann also noted that, like many other technological advancements in the history of printing and publishing, the desktop publishing revolution came from outside the industry. Printing equipment manufacturers, like Varityper, Compugraphic, and Linotype, had spent many years and huge sums of capital to create proprietary hardware and software—and, it should be added, maintained our rich heritage of well constructed fonts. Those firms were not interested in throwing their accumulated knowledge and product lines away and were reluctant to change. However, everything was transformed, seemingly overnight, when a small, relatively young firm—Aldus—turned the industry inside out.

Instead of being frightened by technological change, printers should be motivated by it. Our industry has had an image problem for a long time—we have always been perceived as a trade rather than a profession—and the infusion of computer technology into our processes will help to overcome that image problem. We, as printers, should see change not as a threat, but as a challenge which we must be prepared to face. The question then is, How do we prepare for this challenge?

The Need for Training and Retraining

In answer to the above question, I think the only way we can prepare to face the challenge is by organizing periodic training and retraining programs for printers. Such training will afford them the opportunity to update their knowledge and, at the same time, acquaint them with the changes taking place in the industry.

According to Smith (1991), every industry is in a race—a race to remain competitive, to maintain a reasonable profit, and to experience growth. The printing industry is no exception. However, advances in technology have dramatically changed training needs, especially in the last few years. Smith also argues that forces driving these changes are economic realities, growing international competition, and a workforce rapidly becoming "capitalized," or performing a greater number of tasks through automation and computerization.

For decades, Smith continues, teaching employees basic industrial skills was enough to prepare them to perform production operations. However, computers and computer-driven electronic systems are rapidly taking over the tasks that used to be done manually. Therefore, basic skills training is no longer sufficient. Even the basic requirements for applying normal working skills are changing

radically. As a result, periodic training and retraining programs must be organized—for seasoned as well as new printers—to reflect the changes taking place in the industry.

For educational institutions, the current pace of technological advancement within the industry requires that educators continually fine-tune their curricula in order to adequately prepare students to meet the needs of employers. For this reason, therefore, educators at all levels of education cannot afford to remain docile. Educators can ill-afford to look the other way or ignore advances that impact their subject matter and programs. This means that they must move along with the changes to be able to function effectively.

Experts are of the opinion that preparing students today, for an increasingly digital and technological tomorrow, requires change. It is on this basis that Drucker (1994) emphasized that the employee of the future will be a "knowledge worker." Given that, today's students must learn how to use a myriad of communication technologies which will enable them to function in the future. In addition, Drucker continued, technologies will become more and more overlapping due to refinements and converging systems.

Schools and Industries Must Cooperate

The importance of cooperation between the industry and the schools in planning the curriculum for an industrially-based program, such as printing technology, cannot be overemphasized. This is particularly important because educational institutions are important suppliers of manpower to the industry. In order for schools to adequately provide the skills needed by industry, there must be an open line of communication between industry leaders and educators. Such a collaboration will serve both industrial and educational interests. This communication must be continuous so that interests may be properly served.

In a study conducted at Iowa State University (USA), Odesina (1988) found that schools must reflect changes in curriculum based on technological changes to meet emerging as well as prevalent industry practices. He also stated that, given the changing nature of industry, surveys must be conducted regularly to determine the industry's needs. Curricula must be planned on the basis of those needs.

In order to be well prepared to teach, educators must seek opinions from employers about the expectations those employers hope to fulfill when they hire new employees. It educators use these expectations to change their curricula, printing technology graduates will be given a sound education that will meet industry needs.

Well educated and degreed individuals provide both hope and leadership to the printing industry. For example, people in the industry who hold degrees have improved the image of printing as a profession and have provided new and creative ways of operating and managing companies effectively and efficiently. They have also provided expertise for interacting with digital computers, electronics, satellite transmission, lasers, and integrated systems now being used in the industry. For these reasons, it behooves printing educators to do their very best to provide instruction that meets the needs and expectations of industry leaders.

Conclusion

There is overwhelming evidence that printing technology has changed tremendously since its invention so many years ago. These changes generally are the result of technological advancements in the industry. The increasing use of automated controls in operation, combined with computer or computer-assisted presses and typesetting facilities, has posed a serious threat to the older techniques associated with the traditional methods of printing.

One way to stem the tide resulting from these changes is to organize periodic training and retraining for printers. This training must be aimed at updating their knowledge so as to enable them to perform their functions efficiently. Educational institutions, in cooperation with printing industry leaders, must plan curricula to reflect change and provide relevant skills. The result should be a pool of individuals who possess both a commitment to productivity and the knowledge of computer-integrated printing production.

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Visual Communications on School Web Sites: A Method of Previewing Visuals for Web Publication

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Abstract

This paper is based on the research of a qualitative dissertation using ethnographic and semiotic methods to examine visual representation in school web sites in a large urban U.S. school district. A series of ethnographic and semiotic questions were used in the study to analyze the web site visuals to determine possible interpretations of the visual representation. There was evidence that some of the educators who designed the school web sites in the study published visuals that had more than one possible interpretation and that some interpretations could include forms of gender bias. Educators who are including visuals in school web sites they design can use the questions from the study in order to review their web site visuals for possible negative viewer interpretations.

Introduction

As the ease of authoring web sites has increased, more people are able to author amateur web pages without professional assistance. Visuals are an integral part of today's web sites—background, typeface, photographs, and graphics interchange format (GIF) visuals are used often and may be expected by viewers. Working with these visuals makes the lay-web author an amateur graphic artist within the measurement of the monitor screen. This does not necessarily make the web author a skilled graphic artist. Backgrounds can obscure lettering, fonts can be too varied, and photographs can be pixilated or too dark to see clearly. Copyright-free GIFs, often blinking and changing form in lively animation, are available for the web author to scatter in irritating over-abundance throughout a web page. One facet of the broad issue of amateur graphic application on web pages is the selection of visuals. This researcher is concerned with the selection of visuals for school web pages and reviews methods that were adapted as a tool to examine visuals for the meanings they send to viewers (Maboudian, 1999).

There is a sociological interpretation that an individual viewer makes when looking at a visual. Attention to viewer response is illustrated by the fact that businesses spend sums of money on graphic artists on whom stakeholders depend to deliver effective visuals. Company management expects that the visuals on their web sites will convey positive messages about their products to a global audience. To achieve successful visuals, it is necessary to know who the members of the broad web audience are and how they will interpret the visual based on multicultural experiences and a variety of social identities. For those who create web sites with visuals and who do not have expertise in graphics and their effects, the results can be less than positive. In the case of school web sites, the visual representation can send a negative message about who is expected to learn and what they are to learn.

School Web Sites

When educators are mandated to develop web sites, these sites represent the school as an educational institution and indicate behaviors that represent the education process and its results. The visuals play an important role in this representation. A photograph or a GIF provide codes that the viewer interprets through his or her own knowledge of social behaviors. (A common example of how we interpret and act on the social meaning of visual representation is the graphic representation that guides us into the appropriate pubic restroom in the U.S.) Visual representation in a school web site becomes problematic when the number of possible interpretations increase and when interpretations can exclude some students or demonstrate a different and therefore unequal behavior for a portion of students. While this

study (Maboudian, 1999) was focused on gender differences, the application of analysis is appropriate for multi-cultural studies and differences in scholastic emphasis among disciplines.

Individual instances of possible gender bias were found in photographs and GIFs that were selected to represent schools on published web sites. While school web sites are not selling a product or service to an autonomous customer, they are promoting student images. The school web site is an official government statement of what is socially accepted as appropriate behavior for identifiable students (male or female). If students are not equally represented, then inequity is introduced into a new technology. It may be that, in the newness of this technology, the school web site authors are forgetting to treat a symptom of a common social ill. What would have been recognized as biased illustrations in a school textbook seems to be ignored in the effort to scan, size, and place a visual on a published school web site. The result is like taking two steps back when female students are represented as missing or reticent in photographs that visually represent student participation in technology-related and other activities.

What Can Go Wrong?

All of the publicly available web sites in one of the ten largest school districts in the nation were examined. The results in numbers did not constitute overwhelming evidence of bias. The ratio of girls to boys that could furnish a content analysis with objective data did not communicate to the viewer the meaning of the social codes in the visual. For example, the precise count of two girls and one boy in a photograph of a school computer lab would not be accurate data representing visual communication because visual communication is not wholly determined quantitatively. Consider that in this photograph the two girls sitting at computers were talking while the boy was depicted in the forefront, operating a computer with—what could be interpreted as—diligent absorption. The viewer's interpretation of the signs, which comprise the communication of the visual, must be cautiously described, not objectively counted. This qualitative data requires ethnography or semiotic analysis to unpack the possible interpretations that the viewer might have upon looking at the photograph.

In the study, visuals were categorized and analyzed using tools taken from both ethnography and semiotics. Data was obtained, detailing elements of the visuals and describing possible interpretations. It was important to maintain tentative terminology in order to convey the numerous interpretations possible based on multiple cultures and identities. What may have seemed to be a traditional photograph of boys and girls in an elementary school garden to one person could have been a statement to another person that girls do not use shovels, or that they do not collect bugs for a science project. If a female student were to view a photograph of a computer lab in which girls were absent or reticent, the message in the visual could form her own identity as a non-participant, especially coming from the context of the authoritative school web site that favors utilization of technology. A stereotypical element that has been developed around computer use in which the female is depicted as confused about computer use, or is less adept at using computers than her male counterpart (Weinstein, 1998), could possibly be manifested in the visual. In the school arena, this can become unfair bias which educational institutions may wish to avoid. While schools attempt to include female students in math, science, and technology courses in scholastic programs, the visuals on school web sites may be counteracting efforts to equalize educational opportunities. In order to avoid this, school web authors need to be aware that other possible interpretations exist and personally scan their visuals for bias before scanning them.

Tools to Scan for Bias

While conducting this study, semiotic and ethnographic methods were used to develop questions that became tools used to detect and analyze evidence of possible multiple interpretations in elements that comprised the visuals. A series of questions prompted analysis processes that were recorded and then examined holistically. Educators can use these tools when selecting visuals for school web sites.

The ethnographic work of Carspecken (1996) sug-

gests methods of asking question to bring out social meanings that are embedded in words and actions. These questions were applied to photographs and GIFs in the school web sites. Two questions stood out as common sense guides: 1) How could someone else view the photograph?; and 2) Why was the visual selected for the web page? In answering these two questions, the researcher unpacked social meanings by viewing three perspectives of interpretation. An amateur web designer could take the same steps.

The *objective* perspective of the visual was described first. The objective perspective included the elements that existed in the visual that multiple viewers could see and agree on. The researcher named everything at this point, withholding her interpretation. Who was in the picture? How many people were in the picture? Were there children, or adults, or both? What ethnicity and gender were the people? What were they wearing? Who was sitting and who was standing? If there was a computer, was someone sitting at it? Was anyone standing beside a person sitting at a computer? If someone was standing beside a person at the computer, were they leaning over that person? Was anyone looking at the monitor screen? Were there male or female participants? The line of questioning was dependent upon what was in the visual in order to observe the elements of the visual. Third parties were asked to contribute as peer checks. Visual elements were identified by observing and describing them in terms that were as neutral as possible.

Next, *normative* questions were asked about the visual. Normative was defined as common *possible* interpretations. Notice the use of the word possible. The observer should not state that an interpretation is absolute or that there is only one, certain explanation of meaning. It is possible to glean normative interpretations based on traditions of hierarchy, historical eras, social activities, gender, class, or ethnicity.

For example, the researcher observed a teacher in one photograph posed with students in a computer club. Two males were posed standing with the teacher, while the only female student was down in front with two other males. The researcher listed ways in which the norm in our society might interpret teacher-student interaction as it was depicted in the visual. What do different groups in our society think about the teacher in the classroom? Why is the teacher depicted in the selected visual?

The photograph mentioned earlier of two girls and a boy in the computer lab could be described in terms of normative interpretation of male/female behaviors. The girls were chatting while the boy worked at the computer. A possible normative interpretation would be that girls spend their time in computer class chatting, or are less interested in using computers. If a female student were to see this visual on the school web site, what would she think and how would it effect her behavior? Why was the visual selected by the school for publication on the web site?

There was a third realm of interpretation. After objective and normative observation, an intersubjective examination was carried out. Intersubjective examination was accomplished through the question of what a person *might* do based on "third-person position-taking" to determine possible social explanations of observed behaviors, or in this case, visuals (Carspecken, 1996, p. 98). The intersubjective realm is speculative. Through human experience, one can understand what someone else might think in a given situation, but one can never be certain that one's supposition is correct. This point is key—the intersubjective interpretation is uncertain. Intersubjective perspective was very important to include because of the personal nature of individual interpretation of visuals and the effect it has on individual identity and resulting behavior. Intersubjectivity comes close to getting into the other person's head, but never fully claims to do so. One undertakes intersubjective interpretations informally when one interacts with others, understanding what one is expected to do in the course of interactions. By describing this type of observation and defining its limitations, a web designer has a tool with which to review visual representation for possible interpretations by viewers.

Semiotics offers another method of analyzing visual representation. Semiotics is a system of signs (such as those in visuals) that have social meaning (Chandler, 1998). This supports the examination of the social interpretation of the viewer. Awareness of semiotics when selecting a visual in a school web site can help the web designer understand the variations in student interpretations.

According to Berger (1998) semiotic "Codes are highly complex patterns of associations that all members of a society learn. These codes… affect the ways that individuals interpret the signs and symbols they find in the media and the ways they live." (p.26). The codes are not only the elements we see, but are the meanings we learn to give them. Berger reminds us that codes can be so commonplace that they seem to be natural.

According to Muffaletto (1995) these codes construct the identity of the reader. A juxtaposition of a male student at a computer working and two female students at computers, turned in their chairs, chatting, are meaningful within the context of a visual in a school web site as indicating accepted or expected student behavior. The student reading a visual in the school web site will read not only what is there, but also what is not there. A male student sitting alone at a computer can mean the absence of a female counterpart. The absence of girls at computers may communicate an unspoken expectation of a behavior that literature describes as hidden curriculum (Apple, 1998; Carspecken, 1996; Noble, 1998). In this case, hidden curriculum could conceivably prohibit females from using the computers and could even discourage female students from going into higher paying, prestigious jobs in computer technology fields.

The educator designing the school web site can ask questions, as this researcher did, in order to seek understanding of possible interpretations based on semiotics. Similar to the ethnographic examination, the researcher viewed all elements of the visual, such as clothing, position, objects, and gender. The researcher then posed questions about the elements and how they worked to form meaning (Chandler, 1998). What stereotyping might have been supported in the visual? Could the meaning change across time? What would the visual mean if a person or object were left out, or different?

The web designer can implement the same procedure. Part of the process here is to identify what everyone would be able to see and determine how it fits into possible identities. Think about what various individuals with their own experiences might think of the visual. For instance, a picture that depicts a little girl in curls and a dress from the style of the forties or fifties, sitting in a classroom, raising her hand to answer a question, could be interpreted in multiple ways. Her pose may be interpreted as being a good student. However, a student viewer might see her negatively as a teacher's pet, or a sissy who cannot play sports. The end result of this line of questioning is a broader view of how students and others viewing the visual in the context of a school web site could interpret a visual. Depending on the variation between the intended message and that received through individual interpretation, the result could seem like a misinterpretation.

Conclusion

The issue described in school web site visuals is similar to the awareness that was developed in the seventies regarding textbook illustrations that depicted gender and ethnic differences that induced inequities in student behaviors. Some differences are that school web sites are more frequently published, go through a less complicated process for publication, and are part of a newer medium. The medium of technology is influential and, when coupled with the importance of an educational production, makes an impressive and global statement.

Educators need to be aware of the impact that visuals have when selecting them for school web sites, just as many businesses are when selecting their visuals for e-commerce. The development of students' identities may be influenced by visuals they see on their school web site. Students who view their school web sites are consumers of the meaning they interpret from the visuals. Ideally, school web site visuals should have a positive effect on all students. Educator awareness when developing web pages can help achieve this. The tools described help to support this awareness.

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Higher Education Web-Based Instruction in the Digital Age

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Educators have been looking for better ways of delivering knowledge to students for years. According to Leonard (1999), knowledge does not need to first pass through the instructor as the primary gatekeeper for learning to occur. He refers to this as an Industrial Age education model which should not be revisited in the digital era. More appropriate to the digital age is the learner-centric model in which content is manipulated by the learner rather than the instructor. The instructor acts as a coach and a program manager directing projects. This model engages students in their own learning. Educators know that learning can occur outside the classroom environment. Even for traditional classes, students do "homework" by going to the library, reading books at home and, in the digital age, using the internet to acquire information.

Distance Education

An alternative mode of delivery that has been around for a long time is learning through distance education. Distance education can be defined as a separation of teacher and learner in space and/or time (Perraton, 1988). Distance education can be characterized in three distinct generations that have emerged with the changing technology (Moore & Kearsley, 1996). Schneider (1999), describes correspondence study as the first generation of distance learning, dating back as far as 1883. Students received course materials at home and sent responses back to the instructor by mail. There was generally a time lag for communication between teacher and student. The second generation came about in the 1950s and 1960s with the use of broadcast media such as radio and television. Print materials were still used, but communication between teacher and student was improved. Interaction among students, however, was still scarce. The third generation of distance education has emerged during the last few years with the use of computers and the digital communication era. This recent change in technology has altered the way distance education serves distance learners (Schneider). Multi-directional interaction can now occur between both students and teachers as well as students and students (Schneider).

Distance Education via the World Wide Web

As popularity of the World Wide Web increases, its use as a means of delivering instruction also increases (Shih, Ingebritsen, Pleasants, Flickenger, and Brown, 1998). With more schools, businesses, and individuals obtaining computers and accessing the World Wide Web, there has been an increased demand for higher education to offer courses over the internet. Distance education has now become more popular than ever in the form of web-based instruction. "The potential of technology, combined with the availability of computer systems, has resulted in an increased use of computers for teaching and learning in education" (Henke, 1998). Colleges all over the world are competing for the distance education student separated by space and time yet easily connected through a computer and the internet. Those educational institutes unwilling or unable to use this technology as an alternative delivery method may not survive the next wave of change brought about by the digital age (Leonard, 1999). Those willing to adopt this technology have created a feeding frenzy for web-based instruction. Faculty in institutions know if they do not do it, someone else will. With this explosion of offerings there is some question as to the effectiveness and quality of the instruction being offered. There are currently no policies in place to determine the quality of web-

based instruction, yet faculty are moving ahead with this mode of delivery not knowing all of the issues involved (Meyen, et al, 1998).

Can Distance-Delivered Instruction be Effective?

Most educators are in agreement that distance education may not be the preferred method of delivery when compared to a traditional classroom setting. Human interaction is certainly easier in the face-to-face traditional classroom. It must be asked, though, can distance delivered courses be as effective? Most research done in this area has indicated that it can. Alternative methods of delivering courses provide access to students who otherwise may not be able to take the course. This is the strength of distance education.

The profile of the distance education student is rapidly changing. According to Henke (1998) advanced technologies are providing unique opportunities for educators to develop effective instruction to meet the needs of today's distance education student. Easier access to continued learning is more important than ever. Companies are encouraging employees to get more training while maintaining full-time employment. Web-based instruction is ideally suited for this type of market because of the increasing accessibility of the internet.

Willis (1999) describes the technological innovation process for distance education in three stages: birth, death, and resurrection. In the birth stage new technologies evolve with unrealistic expectations. The new tool is over-hyped. In the death stage there is a realization of what the technologies cannot do and the interest and enthusiasm for the tool quickly fades. In the resurrection stage, the technology is tested in various instructional settings and a niche is found for its particular setting.

Critics of web-based instruction thoughtfully ask several questions: Will web-based instruction progress through the same stages as other technologies in distance education? Why does web-based instruction have such a strong following? What is the big hype all about? Is it the cure-all technology for distance education or will it ultimately proceed to its death? Web technology is much different than any other technology used thus far in distance education and it has not yet reached its full potential.

Differences Between Web-Based and Other Types of Distance Learning

One component that differs with the web as a tool for delivering distance education is the interactive abilities previously not available in other distance education models. Students can complete assignments and take quizzes on-line. Those quizzes and assignments can be submitted and graded immediately. Students can receive almost instant feedback, something difficult for most instructors in a traditional classroom to provide.

Communication is also improved in a web-based environment. Communication with the instructor and other students is an important aspect of an educational environment. Perhaps this has been the biggest limitation of distance education. With web-based instruction, communication is still a limitation, but it is much improved as compared to previous distance education models. Through the use of electronic bulletin boards, chat rooms, and e-mail, instructors and students can communicate with one another at any time. Communication can be both synchronous as in a live chat room and asynchronous using bulletin boards and e-mail. Administrators and professors from colleges and universities are adopting web course technology packages with these built-in communication tools, so the online environment is becoming standardized.

What about the human factor of communication? Body language is a form of communication not yet available on the web. Yet, our society has already begun to introduce a human-like component into electronic environments. Frequent "chatters" have developed their own electronic expression of human emotion, such as typing "LOL" (Laugh Out Loud) when humor is felt. There is the capacity on chat lines to send animated icons to the receiver such as a hand-wave for good-bye or other gestures expressing human emotion. These electronic human-like components will become more and more a part of communication in the digital age. Some instructors will use these forms of electronic expression to bring the human component into the online teaching environment.

Evaluating Web-Based Education

According to Leonard (1999) the movement from campus-based learning to web-based distance education will be an inevitable result within and outside of academe. But will web-based instruction be as effective? What are important learning factors in web based courses? According to Shih, et al. (1998), research is needed to understand student learning strategies and patterns of learning with different learning styles via the World Wide Web. Why are some students more motivated than others? Why are some students more successful with online instruction than others? This type of research could lead to predictors of success for students enrolling in web-based courses.

More research is also needed to determine effective ways of evaluating web-based courses. Technology is moving so rapidly in web-based education that it is like trying to hit a moving target. According to Sherry (1996), evaluation should be a continual revision process based on feedback from instructors, students and content specialists. The technology exists to provide immediate response and analysis from students using point-and-click feedback, something other distance education models cannot provide. This technology allows teachers the opportunity to adjust their teaching styles to accommodate individual differences while the class is being conducted (Champagne, 1998). As more research is done, educators will be able to utilize this information to help plan, organize, and deliver quality web-based instruction in such a way that will improve student learning.

Conclusion

Web-based instruction is here to stay. It has not yet reached its "death" as other distance education technologies have. It has not even reached its full potential. Bandwidths are increasing as cable companies become involved in providing internet access to home users through cable lines. Access and speed will continue to increase and the quality of online courseware will continue to improve. Just as the digital age has just begun, the "birth" of web-based instruction has also just begun.

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Security Features on Printed Documents

Jeff Jensen, for Professor Jerry Waite
Industrial Technology Department
University of Houston

It is easier than ever to forge documents because technology is becoming more powerful on a daily basis. Most people do not realize that color copiers and laser printers are capable of producing forged documents that are very hard to distinguish from the real thing. It is very important that manufacturers, vendors, and end-users educate themselves about the security features that are available for documents. Printers who provide security features on documents may be able to gain more business from safety-conscious customers.

Computers, and people who are proficient in using them, can be very dangerous to any business if proper steps to ensure document integrity are not employed. Just about anyone who has access to a scanner, laser printer, and a color copier can easily duplicate documents. Unfortunately, untrained observers will not be able to tell that the duplicate is not the original. Obviously, the main security concern must be for checks and other bank notes. However, there are a number of other documents that should also be protected from forgery. Some of these documents include gift certificates, event tickets, birth and death certificates, titles, coupons, registrations, and parking permits.

Though nothing is completely fool proof, security features can make it more difficult to duplicate documents. MICR (magnetic ink character recognition) numbering on checks was a fairly safe security measure for years. However the addition of MICR numbering by itself no longer ensures a counterfeit-free product. The key to the safest documents today is multiple security features. Even clever and competent forgers will have difficulty duplicating documents if several security features must be overcome! It is important for printers to inform customers of the need for multiple security features as well as explain those features that are applicable to a given document.

Low-Cost Security Features

Printers can offer customers five security features for little or no additional cost. These low-cost features include warning bands, padlock icons, microprint lines, security screens, and pantographs.

The most basic security features available are warning bands, padlock icons, and microprint lines. Warning bands are stripes composed of reversed-out type around the perimeter of a document that point out what security features have been used on the page. A padlock icon serves the same purpose as warning bands. For example, the document could have a small lock printed on the front, and the back would contain a list of the security features that have been employed. A microprint line is usually a line of one-point type. The content of a microprint line cannot be distinguished without a magnifier.

Newer technologies, like security screens and color pantographs, can be added to the basic security features. Screens are light-colored backgrounds on a document. Pantographs are light-colored pattern backgrounds. Screens and pantographs can be custom backgrounds, such as step-and-repeat logos, or they can include a message that can only be seen when it is copied or photographed using a camera.

Special Security Features

Security features are not only graphics-related. There are many paper and ink combinations that make documents more difficult to forge. The paper used for a job can have embedded fluorescent fibers that can only be seen under an ultraviolet light. Chemically reactive paper, specialty inks, and foil embossing are other examples of special features to ensure more safety.

Selling Security Features

Whoever is selling security features must be knowledgeable of what features are available, and know when to stress the need for security to a client. Cost is always a big concern for any end-user, especially for those who have never been "hit." Many customers choose to take their chances until one of their documents is successfully forged. However, that attitude needs to change—companies must be proactive in protecting their documents.

Not only is the use of security features a common-sense issue, it is becoming a legal point as well. The legal concept of "due diligence" requires firms and individuals to assume responsibility for their documents. Up until 1990, banks were held responsible for check fraud. The concept of comparative negligence was introduced in 1990, when articles three and four of the Uniform Commercial Code brought businesses into the loop of responsibility. A business must now show due diligence in protecting their documents—including everything from incorporating security features in a document's design to storing checks safely. Therefore, your customers may need to go a few steps further in securing themselves. (Printers are businesses, too. You should use security features to protect your own documents.)

Because of due diligence, many customers are willing to go all-out in securing their documents. However, such overkill is not always wise or necessary. For instance, a small company with regular employees may not need as many security features as a big company that uses a lot of seasonal or contract labor. This is where the printing salesperson's expertise proves invaluable. For example, you might suggest that the small firm purchase a number of different check styles and alternate their use as safety measure. On the other hand, you may recommend that your larger clients use a combination of basic and special security features.

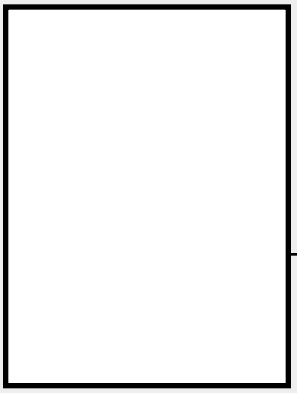
Conclusion

Cost is the main concern with any kind of printed security feature. Happily, basic security features can be added for little or no cost. Furthermore, the cost of special security features is decreasing, so they are becoming easier to sell.

You can easily sell security features to your customers who have been the victim of counterfeiting or forgery. If you can convince your other customers of the importance of document security, you may very well sell them too.

Due diligence has brought the customer into the loop of responsibility. Therefore, some clients are willing to spend what it takes to add security features to their documents. So, by explaining forgery techniques to your clients and by showing samples of security features, you are protecting the customer's interests.

As a manufacturer, the ability to provide as many security features as possible makes you more important to your clients. It is obvious that clients are likely to keep their important vendors, so providing and selling security features will help ensure your chances of longevity in the printing business. You might make a little extra profit for yourself, too.



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Eligibility for Publication

- Only members in good standing of the International Graphic Arts Education Association, Inc., or students of IGAEA members, may publish in the Visual Communications Journal.

Audience

- Write articles for educators, students, graduates, industrial representatives, and others interested in graphic arts, graphic communications, graphic design, commercial art, communications technology, visual communications, printing, photography, journalism, desktop publishing, drafting, telecommunications, or multi-media.
- Present implications for this audience in the article.

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The Visual Communications Journal accepts four levels of articles for publication:

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- Prose must be written cleanly and correctly. Editors will make only MINOR corrections.
- Submit a maximum of ten word-processed, 8.5" × 11" pages (excluding figures, tables, illustrations, and photos).
- All articles MUST be submitted in electronic form.
- The text of the article is to be submitted electronically. The preferred method of submittal is as an attachment to an e-mail sent to jwaite@uh.edu. Alternatively, articles can be submitted on a 3 1/2" disk, or on a CD-ROM. Zip or 3 1/2" disks can be either PC- or Macintosh-formatted, but CD-ROMs must be formatted for the Macintosh or be in the ISO 9660 format.
- The text must be submitted in ASCII text OR in the Microsoft Word format. Please do NOT submit text saved in any WordPerfect format. *DO NOT submit documents created in page-layout programs.*
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- You may submit either digital artwork or hard copies. Electronic artwork is preferred. Please all artwork files and/or hard copies with the first submission.
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- Be sure to include your name, mailing address, e-mail address (if applicable), and daytime phone number with your materials.

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