

*"Genius without
education is like
silver in the mine."*

B. Franklin

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About the Journal

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* ...Chris Lantz served as a juror for the *Journal*, but did not review his own paper.

** ..Jerry Waite served as the editor of this *Journal*. However, his article was submitted blindly to the review committee.

Editor's Note

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

This issue of the *Visual Communications Journal* has something for everyone involved in graphic arts and graphic arts education. All faculty involved in teaching graphic arts will appreciate an article by Harvey Levenson from California Polytechnic State University. Harvey outlines several very important philosophical premises that underlie successful graphic communication programs. I shared a manuscript version of this paper with my advisory council in Spring 2007 and it provided a very useful starting point for discussions about the future of our program. *I strongly advise all graphic communication professors, instructors, and teachers to read and share Harvey's important work with their colleagues and advisory committee members.* University and college faculty should also note that Harvey's statement is now incorporated into the philosophy of the Accrediting Council for Collegiate Graphic Communications (ACCGC), the premier accrediting body for college- and university-level graphic arts programs.

Managers and print management instructors will certainly enjoy Gregory D'Amico's look at strategic alliances among midsize commercial printing companies. Speaking of alliances, Yung-Cheng Hsieh writes about his experiences creating several very effective alliances among his graphic communication program, museums, and industrial partners. As a result of these alliances, Taiwanese artistic treasures are available to wide audiences through extensive websites as well as through commercial products that depict the artworks. Even better, all the participants—even the graphic communication program—benefited financially from the alliances!

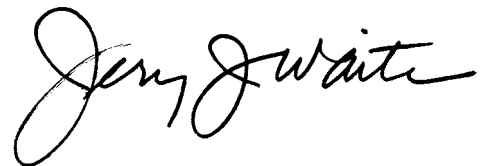
Robert Bordley, an author new to the *Visual Communications Journal*, takes a mathematically-challenging process—decision making—and uses graphic design principles to make the process less daunting. Size and color become media to assist individuals in making risky decisions.

Classroom teachers will enjoy learning that Monika Zarzycka's "graphic design for non-designers" course actually makes an impact on the large number of students who enroll in it. Students who haven't a clue about color, balance, rhythm, and proportion create graphic products at the end of her course that are demonstrably better than those they make at the beginning of the course.

Finally, anybody involved in distance education will appreciate the profile of students' use of technology in Arizona State University on-line courses that is provided by LaVerne Abe Harris and her colleagues. Interestingly, the researchers found that students tend to shy away from some of the very technologies—such as blogs, chat, and listservs—that are supposed to make on-line courses as "interactive" as face-to-face sections.

As is often the case in our small-but-productive profession, an article that appears in this edition of the *Visual Communications Journal* was co-authored by the *Journal's* editor (me). This article was submitted to the same peer-review scrutiny as the other papers and was accepted using a double-blind review process. In addition, a unanimous positive vote by the reviewers to publish the article as a refereed publication was received. Documentation regarding the voting on these two articles is available by contacting me at jwaite@uh.edu.

Finally, thank you to the *Journal's* Editorial Review Board. I truly appreciate the time and effort invested by Cynthia Gillispie-Johnson, James Tenorio, Zeke Prust, Bob Chung, Malcolm Keif, Chris Lantz, and Mark Snyder.



Factors for Successful Strategic Alliances Among Midsize Commercial Printing Companies

by Gregory S. D'Amico, Ph.D., Kean University

Introduction

In the rapidly evolving graphic communication industry, there is increasing pressure for commercial printing companies to form successful alliances with other companies in order to remain competitive. These pressures have intensified over the past two decades with the advent of complete digital workflows, changing customer needs, and increased sources of business competition. The types of companies typically involved in such alliance chains represent a wide variety of areas including, but not limited to, graphic design, website development, database management, paper, ink, trade printing, specialty printing, binding and specialty finishing, and fulfillment. As Paul Keith, President and CEO of International Business Solutions, noted, "to satisfy end users' get-it-here-now attitude, many printing companies find allies in each other. Collectively we can do so much more than we do individually" (as cited in Painter, 2005, p. 26). Similarly, Georgianne Plumberg, product manager for forms papers at Boise Paper Solution, commented that "today's competitive climate is the incentive many companies need to strengthen supply-chain bands. The biggest advantage for distributors and printers is to have resources who know what they don't, because none of us can be experts on everything" (as cited in Painter, 2005, p. 26). Robert Sinrich, an executive at Creo, noted that the companies that succeed are the ones that come together; Joe Bently, an executive at Harrison Leifer DiMarco, concurred, stating that strategic alliances are very much the trend and the key to success (as cited in Frank, 2003).

Whipple and Frankel (2000) developed a list of factors, compiled from an extensive literature review, that were identified as having the potential to influence the success of a business alliance. In their research of companies in the food and health-care industries in North America, they asked respondents to list the five most important factors for a successful business alliance. They found that the five top success factors were: (a) trust; (b) senior management support; (c) ability to meet performance expectations; (d) clear goals; and (e) partner compatibility. According to Whipple and Frankel, although there was consensus among all buyers and

suppliers on which were the five most crucial success factors, they were less consistent on their ranking of how important these factors are for business alliances.

In another study, conducted by Sherer (2003), there were eight success factors identified on manufacturing networks for small and medium-size firms. Ranked by perceived degree of importance, they were: (a) participant character; (b) chief executive officer (CEO) support; (c) confidence; (d) dedication; (e) capabilities; (f) external relationships; (g) use of intermediaries; and (h) information technology communication systems. Although three of Sherer's factors (participant character, chief executive officer support, and capabilities) coincided with three of Whipple and Frankel's (2000) factors (trust, senior management support; ability to meet performance expectations), the other five success factors identified by Sherer added further information about the complexity of such alliances. The combined results of both studies identified 10 factors to the formation of successful business alliances: (a) trust/character; (b) senior management/CEO support; (c) ability to meet performance expectations/capabilities; (d) clear goals; (e) partner compatibility; (f) confidence; (g) dedication; (h) external relationships; (i) use of intermediaries; and (j) information technology communication systems. These factors were examined in the present research in alliances among midsize commercial printing companies in the graphic communication industry.

Need for the Study

According to Whipple and Frankel (2000), the formation of alliances between companies has shifted the unit of competition from between firms to between supply chains. Thus, to remain strongly competitive, it is in the best interests of companies to participate in strategic alliances with other firms which bring to the alliance unique strengths and resources. They note, however, that "creating, developing, and maintaining a successful alliance is a very daunting task" (p. 21). Sherer (2003) observes that although this trend toward forming alliances is growing, especially among small and medium-sized firms (SMEs), there is sparse research evidence on what factors are critical to their success.

This qualitative study contributes to the body of knowledge, especially as it applies to the graphic communication industry. Specifically, it provides data on industry experts' perceptions of which factors previously identified as key to the success of alliances among midsize firms in other industries are crucial to successful strategic alliances among companies in the graphic communication industry. Furthermore, it has also made an important contribution to the extant literature by bringing to light an additional factor identified by the experts as playing a significant role in the formation of successful strategic alliances among midsize companies in the commercial printing industry.

Purpose of the Study

This qualitative study explored the relevance of critical factors for the formation of successful alliances in midsize commercial printing companies. The following research questions were posed:

1. How do previously identified factors critical to the establishment of successful alliances for businesses in other industries relate to the formation of successful alliances for midsize commercial printing companies as perceived by key personnel in the printing industry?
2. What additional factors are identified by key personnel in the printing industry as critical to the formation of successful alliances in midsize commercial printing companies?

Method

This qualitative study used in-depth interviews with industry experts regarding their perceptions of what factors were significant in forming successful alliances for midsize commercial printing companies. In-depth, one-on-one interviews allowed the expert participants to more openly discuss their perceptions than would have been possible via a more impersonal quantitative survey instrument and provided rich and detailed information based on their extensive experience. A semi-structured format of open-ended questions with in-depth follow-up discussions was used.

According to Silverman (2005), "qualitative research tends to work with a relatively small number of cases... detail is found in the precise particulars of such mat-

ters as people's understandings and interactions" (p. 9). In this study, the small sample was comprised of six expert participants in the U.S. commercial printing industry with broad-based knowledge in forming business alliances. All six participants are based in the North East, but have extensive national and international experience. They included:

1. A male consultant in graphic communication with a specialty in alliance formation with more than 30 years experience;
2. A male senior executive of an international graphic communication trade association with more than 25 years experience;
3. A female veteran printing industry person with more than 20 years experience;
4. A male chief operating officer of a midsize commercial printing company which had successfully formed alliances throughout the industry with more than 25 years experience;
5. A male president and CEO of another midsize commercial printing company with successful alliances throughout the industry; and
6. A male vice-president of marketing at a vendor company with more than 20 years experience.

The interview guide was based on the 10 factors identified as contributing to the success of the formation of successful alliances, derived from the findings of Whipple and Frankel's (2000) and Sherer's (2003) research. The questions focused on the six participants' perceptions of critical factors and their relevance to the formation of successful alliances for midsize commercial printers. The questions were also geared to elicit their perceptions of any additional factors that were relevant to the formation of successful alliances for midsize commercial printers. The interview guide was reviewed by a four-member jury of experts: a university professor with expertise in questionnaire development and survey research; two university professors of graphic communication management; and one senior graphic communication executive familiar with the formation of strategic alliances in the graphic communication industry.

Using a three point scale (3 = major contributor to success; 1 = minor contributor to success), each of the six experts categorized each of the identified success factors in terms of their degree of importance—Major, Moderate, or Minor—for the establishment of a successful alliance for midsize commercial printers. Factor ratings were totaled. Those scoring between 15 and 18 were categorized as major contributors, those totaling between 11 and 14 as a moderate contributor, and those scoring between 6 and 10 as a minor contributor.

Each of interviews lasted anywhere from two to three hours and took place between January 2007 and April 2007.

Results

The six participants unanimously found each of the 10 success factors, originally identified by Sherer (2003) and Whipple and Frankel (2000), to be relevant to the formation of strategic alliances for midsize commercial printing companies. They also identified one additional factor—flexibility—as being an important consideration for the success of strategic alliances in commercial printing companies. Based on the rating system described above, the

Strategic Alliance Success Factors	Degree of Importance		
	Major	Moderate	Minor
1. Trust/Character	X		
2. Senior management support/CEO	X		
3. Ability to meet performance expectations	X		
4. Clear goals	X		
5. Partner compatibility			X
6. Confidence		X	
7. Dedication		X	
8. External relationships			X
9. Use of intermediaries		X	
10. IT Communications systems	X		
11. Flexibility	X		

Table 1
Expert Interviewees' Rankings of Success Factors in terms of their Degree of Importance in Forming Successful Alliances among Graphic Communications Companies

factors for success are presented below within each of the three categories of degree of importance: major, moderate, and minor (Table 1). It should be noted that the new variable identified as important for success by this sample of six experts was unanimously perceived by them as being a major success factor in the formation of alliances for midsize commercial printers.

Major Success Factors

- Trust/Participant Character.** When forging a strong alliance, each member company is expected to perform in a manner congruent with stated goals and objectives. According to one expert, "The key idea here is that there should be no hidden agendas when defining goals and objectives of each member company and the strategic alliance."
- Senior Management Support.** Crucial to a successful alliance is the support of top management in each company for the endeavor by contributing to the strategic direction/vision of the alliance and also by supporting operations in terms of budget, time, and decision making.
- Ability to Meet Performance Expectations/ Capabilities.** As with any team, all team member companies must be able to execute those responsibilities expected of them in a timely and efficient matter. Each firm needs to practice fundamental responsibility with respect to performance quality and deadlines.
- Clear Goals.** Goals for the alliance and each of the participating companies must be clearly stated and aligned to formulate an agreed-upon vision during the formation of the alliance. Fundamental to the success of any alliance network is that each company member must benefit from the alliance. In the words of one interviewee, "the fundamental premise is mutuality of benefits. The supply chain alliance only works when all member companies are better off being in the alliance."
- Information Technology (IT) Communication Systems.** Strong IT means waste-free transactions and indisputable measurements (e.g., regarding schedule conformance, job specification, shop floor data, lab specifications, etc.). In addition, with the introduction of computer-integrated manufacturing (CIM) and job definition format (JDF), one expert

claimed, “well-designed and maintained communication systems have become critical for successful alliances in the graphic communication industry.”

6. **Flexibility:** All participants unanimously cited the critical need for the strategic alliance between midsize graphic communication companies to remain flexible. As one expert put it, “increasingly we have to reinvent our business every two years. Partnerships need to be re-examined on a frequent basis. Technological advancements in graphic communication—as disrupters or enablers—can be one very important catalyst for this.” Another stated that, “sometimes goals change as the alliance progresses—we need to take on more challenging goals and often need to shift the balance in the relationship with respect to who contributes what and what the specific roles and responsibilities will be. Oftentimes it becomes necessary to change the formation of the alliance by replacing some of the older member companies with more appropriate companies.”

Moderate Success Factors

1. **Confidence.** As with any business vision, confidence and belief in the joint venture alliance plays an important role in accomplishing objectives. “Participants rise to the occasion when they believe they can,” stated one participant.
2. **Dedication.** All participants must remain dedicated to the goals of the strategic alliance as well as to those of their own companies. As one interviewee stated, “few strategic alliance business plans go exactly as expected and commitment by member companies plays a critical role in its long-term success.”
3. **Use of Intermediaries.** Trade association groups specific to graphic communication and the appropriate government agencies can play a strong role in bringing the right companies together to form an alliance and keep communication channels open. As one participant stated, “neutral parties can be extremely helpful for diagnostics and problem solving.”

Minor Success Factors

1. **Partner Compatibility.** While viewed as being important, partner compatibility was not viewed as

being as important as the other factors in supporting alliances among midsize commercial graphic communication companies. Several experts stated, however, that it was helpful when alliance member companies had similar organizational cultures and objectives.

2. **External Relationships.** The personal relationships among participants involved in the network were not found to be as important as factors such as top management support, trust, and character. However, all interviewees agreed that building outside relationships, particularly ones based on previous successful joint performance would contribute positively to the future goals of the alliance

Conclusions and Implications

All of the factors previously identified as key to the formation of successful strategic alliances in business (see Sherer, 2003; Whipple & Frankel, 2000) were also perceived by the expert participants in this study as being relevant to the success of such alliances among midsize commercial printing companies. Furthermore, the experts identified one additional variable as also being critical for successful alliances in this field, namely, flexibility.

Of particular importance to the experts were: trust and the character of the participants; support from senior management; member companies’ ability to meet performance expectations; the establishment of clear goals; and the existence of strong information technology communication systems. All six participants were very consistent in their rankings of the original 10 success factors as to their degree of importance. In addition, they were in full agreement that the one additional variable, flexibility, was a major success factor as well. This is in contrast to Whipple and Frankel’s (2000) study where the rankings of success factors were somewhat varied.

There are several important implications of this qualitative study’s results for strategic alliances in the midsize commercial print industry. Midsize commercial printing companies need to build upon the 11 success factors identified in this study when considering the formation of a strategic alliance. When choosing potential business partners, they should seek qualities that build on character and integrity, commitment from top management, dedication, and dependability. In the process of forming objectives for

the alliance, goals and responsibilities for each member company must be clearly stated and the joint venture should remain focused on the mutual benefit of all companies involved.

Furthermore, this study's results indicate that midsize commercial printing companies should capitalize on the strong role intermediaries can play in the formation and continuation of a successful alliance. Communication channels must remain open, and a strong IT communications system linking all member companies is particularly significant in graphic communication in light of recent developments in the areas of computer-integrated manufacturing and JDF (Job Definition Formatting).

A further critical practical implication for commercial midsize printing companies relates to the new factor the panel of six experts identified in this study: flexibility. The increasing rate of technological applications in the graphic communication industry coupled with changes in market structures and global competition makes it important for the strategic alliance to remain flexible with respect to which companies are actually included in the unit and in terms of what their goals and responsibilities will be.

This qualitative study's results also have some interesting implications for the direction future research might take:

1. Using one-on-one in-depth interviews, this study examined key industry experts' perceptions about the significance of previously identified critical for strategic alliances among midsize commercial printing companies. One additional factor was also identified by these same experts as significant to such alliances. It would be important to study whether the results of this qualitative exploratory study can be supported by those obtained from a more broad-based, systematically-designed quantitative study of midsize commercial printing companies.

2. Future research on such commercial printing communication segments as large commercial printers, packaging, and special process printing (e.g., gravure, flexography, digital printing) might help to determine if the findings of the present study can be applied industry-wide.
3. Future research could focus on whether the findings of this study are unique to the formation of strategic alliances for midsize commercial printers or relevant to other industries as well.

References

- Frank, R. (2003). AGC LI: Strategic alliances a must for the future. *Printing News*, 150(24), 1-2.
- Painter, D. (2005, January 25). The need for speed. *Print Solutions Magazine*. Retrieved March 18, 2007 from <http://www.printsolutionsmag.com/issues/january05/cover1.html>
- Sherer, S. A. (2003). Critical success factors for manufacturing networks as perceived by network coordinators. *Journal of Small Business Management*, 41, 325-343.
- Silverman, D. (2005). *Doing qualitative research* (2nd ed.). London, England: Sage Publications.
- Whipple, J., & Frankel, R. (2000, Summer). Strategic alliance success factors. *The Journal of Supply Chain Management*, 36, 21-28.

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Student Profile and Technology Behavior in Web Design Coursework Taught Online in Higher Education

by Dr. La Verne Abe Harris, Purdue University; Dr. Jon M. Duff, and Dot Lestar, Arizona State University

Introduction

The higher education trend to offer distance education in an online environment is prevalent today at large public universities such as Arizona State University. Online education has been redefined as “institution-based, formal education where the learning group is separated geographically, and where interactive telecommunications systems are used to connect learners, resources, and instructors” (Simonson M. & Schlosser, 1995). Presently ASU is charged with the goal of securing an online head count enrollment of 100,000 in the next decade (ASU IT, 2006). Feldman (2006), executive director of the School of Extended Education, has expressed this ambitious goal as having three components: (1) a strategic business plan, (2) a vigorous technical infrastructure, and (3) a design and development process to increase the availability of distance education curriculum.

ASU began its early distance learning commitment in 1935 with the advent of the mail-order correspondence courses. Television courses began in the 1950s. By spring semester 2004, over 200 online courses were offered with an 89 percent completion rate—matching that of the face-to-face courses (McCann, 2006).

There are accepted and validated historical and pedagogical approaches to teaching face-to-face. In the last decade, World Wide Web technologies have opened up opportunities for online learning in higher education. Significant graphic communications content is now delivered via the Internet, and it is appropriate that virtual teaching methodologies be used to teach Internet technologies.

Simonson & Schlosser (1995) determined that in order for the online experience to be successful for the university student “its appropriate application should be based on the belief that the more similar the learning experience of the distant student is to that of the local student, the more similar will be the desired outcomes of the learning experience.” Cutting-edge Web technology adapted in our society has become available for face-to-face course delivery. This in turn has increased the expectation level of Internet delivery of coursework.

The 2.8 million higher education students enrolled in online courses in 2000–2001 represents a doubling in the three years since 1997–1998 (McCann, 2006). With 49 percent of all public institutions offering an online degree, and 97 percent offering at least one online course, distance learning is becoming one of the fastest growing higher education trends (McCann, 2006). Because research is not as robust in pedagogical approaches to teaching online as has been established in face-to-face instruction, and because Internet technologies are constantly updated and introduced, this study was initiated.

In this study, the authors gathered opinion agreement data on the online behaviors and profiles of students who have completed university Web design courses on the Internet. Open-ended questions on the benefits and limitations of taking online courses were included in the questionnaire. Along with demographic questions, other questions were asked about the student usage of e-mail, online chatting, blogging, mailing list server, and browser technology. In order to better understand the results of the survey, an overview of each of the Web technologies is presented.

Methodology

An online survey was taken in three online Web design and development courses at Arizona State University in the fall semester of 2005. The survey was designed to form a profile of the students and their online behaviors. The survey consisted of 17 multiple-choice and open-ended questions and was delivered online. The data from these three courses collectively describe the profiles and behaviors of the distance learning experience so that future online coursework can be continuously improved. The 67 students who participated in the survey took one of the following courses: (1) GIT 394 Introduction to the Web, which is offered to non-majors; (2) GIT 337 Digital Design (HTML), which is a requirement for majors; or (3) GIT 414 Internet Development, which is an elective for GIT majors.

The survey was designed to help learn more about the profile and online behavior of the students, so that

improvements can be made in online course delivery. The survey was voluntary and anonymous with no identifying information collected with the survey results. Fifteen questions were multiple choice and two questions were open-ended. Forty-three out of 67 (64%) students enrolled in the three courses participated.

It is important to understand that online students were initially provided with resources to help them gain basic Internet knowledge required for online course success. This was part of the learning experience. They were provided online and written documentation on the essential technologies necessary to accomplish the virtual format of instruction in accessing e-mail, World Wide Web, chat sessions, course content, and online discussion boards. Additionally, instruction on assignment delivery was posted, along with IT contacts and website links for troubleshooting any technical difficulties. To assure student competency, online discussion boards were set up as class weekly participation modules, thereby maximizing their capability to complete the class successfully in the virtual environment. GIT 377 offered optional Web design tutoring.

Delimitations of the Survey

The survey was set up with forced completion. It could be saved and taken at a later date, but could not be taken more than one time. Emphasis was not placed on value added (how much the content understanding improved from the beginning of the course to the end), or the outcomes (the state of affairs after course completion). In the survey, there was no consensus as to the effectiveness of the Internet technologies— only their utilization.

Results and Analysis

The survey was delivered online using the Blackboard course management system. Participation was voluntary. This survey was independent of, and fundamentally different from, the standard distance education evaluation of teaching and course effectiveness used in all online courses.

Three courses were surveyed: GIT 337 (Web Content Design, N=13), GIT 394 (Website Development, N=40), and GIT 414 (Advanced Internet Programming, N=14).

Sixty-four percent of the population responded to the survey (43/67). Fifty-eight percent of students in the two lower division courses responded; the response rate for students in the one upper division course was 86%.

Profile

Results indicate the profile of the surveyed population is nearly evenly split between males and females (56% male, 44% female); undergraduates made up a majority of respondents (82% undergraduate, 18% graduate); more respondents were not graphics majors (26% majors, 71% non-majors, 3% unsure); and students had some experience with online instruction (first course 36%, two to four courses 26%, five or more courses 38%).

Web Technology Behavior

Respondents showed a preference for desktop computers (52%) over laptops (30%); 18% used both desktop and laptop computers. Operating system preference was decidedly Windows-based (85% Windows, 10% MacOS, 5% combination). Browser preference failed to show exclusive use. Respondents in all three courses used Internet Explorer, though not exclusively. Netscape Navigator was also used by 96% of the students; it was much more likely for upper division students (57%) to also use FireFox, Safari, or another browser than it was for lower division students (0%) to utilize a browser other than Navigator or Explorer.

The data show a majority of online students access online courses using broadband (73% cable or DSL) or wireless connection (21%). Dial-up modem connections were used by 6% of the respondents. The number of hours devoted to the online course increased with the course's level. Students in lower division courses devoted five or fewer hours (49%) or six to ten hours (43%); students in the upper division (GIT 414) course were more than twice as likely to devote more than 20 hours (8.3%) than lower division (3.7%) students.

Surveyed students did not make considerable use of two popular Internet-based communication technologies. Sixty-four percent of the respondents never or only occasionally used instant messaging; more than half (64%) have never used a Web blog. Additionally, 60% have never used a list serve.

Open-Ended Responses

More than half (52%) of the population responded to the open-ended questions.

1. A positive response to convenience was noted. Students generally were positive that the online course met needs for flexibility. However, there were comments which intimated that the more constrictive the online course (specific turn-times, required discussion groups, scheduled tests, etc.), the less the appeal.
2. Many students have experienced scheduling and transportation conflicts that online courses appear to alleviate.
3. There is a feeling that there is not enough “teaching,” as defined in student terms, in an online course. Giving reading assignments and pointing students to Web sites that have resources is not generally defined as “teaching.”
4. There is a feeling among some students that an online course should be self-paced.
5. There is a perception that less learning occurs in an online course than in a face-to-face course.
6. The perception of quality in an online course is related to the amount and clarity of communication and clear time tables for assignment due dates.
7. Because of online anonymity, there is a feeling that online courses provide fewer restraints based on gender, race, or age.
8. Students admit that being a self-learner is critical in predicting online success.
9. A lack of synchronous communication with the teacher and other students appears to be a factor that limits online success. Students would appreciate the opportunity to personally interact with the instructor once or twice during the semester.
10. The type and completeness of feedback on assignments and examinations contributes to perceptions of online quality.

11. Students did not feel that group projects or discussions were particularly effective.

12. Alternative methods for providing documentation (lectures, notes, demonstrations) should be provided. Thirty-two percent of students still print much of the course documents.

Conclusions

Students surveyed in this study were enrolled in courses that provide fundamental skills and knowledge in Internet technologies; they might be expected to embrace those technologies to a greater degree than might the university student population in general. Indeed, more than 60% of the respondents have taken more than two online courses; nearly 40% have taken five or more online courses. There appears to be a developing cadre of students who are technologically and intellectually prepared to succeed as online students in graphic information technology.

Only six percent continue to use a dial up connection. It appears that the availability of appropriate technology for this group is not a problem and has implications for the type of media that can be entertained as part of an online course.

Twice as many students read materials online as those who print online materials. Anecdotal evidence supports that this is atypical to the general student population. However, online students generally bear the entire cost of printing and this may place a serious damper on printing syllabi, assignments, and labs. The implications are that documents that in the past have been static because they were designed to be printed can now be interactive.

There are Internet technologies the surveyed population does not use. Indeed, the negative comments on course discussion groups may be related to not making use of chat, blogs, or list servers. Because technology is not an issue, these communications tools should be carefully monitored for online applicability.

Universally, students believe that communication is critical to the success of an online course. Results indicate that virtual students expressed more frustration from the inability to talk directly to the professor as in a

face-to-face setting. A previous study from California State University, Northridge indicated the same finding (Schutte, 1997). In the CSUN comparison study, evidence was presented to show that online students received higher grades than face-to-face students. Jerald G. Schutte deduced that students compensated through increasing their interaction with each other. The highest performing students reported to have the highest peer collaboration. It appears that students may overcome this feeling of loss in not being able to communicate directly with the teacher by extensive peer collaboration.

Convenience remains a major strength of online delivery. Therefore, any course element that reduces convenience should be carefully considered before implementation. This would include online tests that must be taken at a specific time, synchronous communications such as scheduled lectures, or regularly timed discussions. However, there is an element of expected “self-paced” instruction in students’ perceptions as to what constitutes an online course.

Students bring face-to-face perceptions to the online experience of what constitutes “teaching.” That is, if an online instructor is not actively engaged in delivering instruction, communicating with students, and evaluating performance (all expectations of traditional face-to-face courses), there may be a perception that the online instructor isn’t actually teaching. Of course, these are the same criticisms of traditional instruction: teachers don’t really teach.

Future Study

The pedagogy of online graphics instruction is currently being defined. This investigation has raised several questions worthy of future study.

1. Further studies should be done to determine if online students compensate for a lack of direct interaction with the instructor by increasing interaction among peers, as evidenced in Schutte’s 1996 study.
2. Is there a relationship between the level of self-learning and perceptions as to what constitutes online teaching?
3. Further study should be done to determine the relationship between the level and quality of peer interaction, and a positive perception of online teaching.

4. How do expectations of self-paced instruction impact success in online courses?
5. Determine whether or not a unique and quantifiable pedagogy exists for online instruction and if one does exist, the extent that face-to-face pedagogy enhances or inhibits online success.

Summary

There are compelling reasons to consider that Web design and development be taught online. First, technological overhead has been reduced to the point that most potential students are able to fully engage the online experience. However, because online offerings have developed alongside traditional face-to-face instruction, online has not developed a unique, identifiable, and accepted pedagogy. Teachers and instructional designers bring pedagogical biases to their courses; students bring biases to their learning.

Using the technology to teach the technology may be the most compelling reason for online instruction in graphics. There are some activities, however, that may not lend themselves to distance technologies. This is similar to acknowledging that certain educational activities do not lend themselves to the classroom—hands on laboratories, field trips, internships, shadowing, and work study. Students will adapt to different models of learning, as teachers adapt to a different models of teaching.

References

- ASU IT (2006). *Extended Education*. Retrieved from www.asu.edu/it/news/2006/02/20060206.htm from the World Wide Web on May 26, 2006.
- Feldman, P. (2006). Interview with Arizona State University Director of Extended Education.
- McCann, Jessica (2006). *ASU’s distance learning comes of age through online technologies*. ASUvision online. Retrieved from <http://www.asu.edu/alumni/vision/04v07n02/cover12.html> from the World Wide Web on April 25, 2006.
- Schutte, Jerald G. (1997). *Virtual Teaching in Higher Education: The New Intellectual Superhighway or Just Another Traffic Jam?* California State University,

Northridge. Retrieved from www.csun.edu on the World Wide Web on May 1, 2006.

Simonson M. & Schlosser, C. (1995). More than fiber: Distance Education in Iowa. *Tech Trends*, 40(3), 13-15.

Appendix A: Survey of Online Students

Instructions:

This survey is designed to help us learn more about the nature of the students taking our online courses so that we can better accommodate them in the future.

This is an anonymous survey, no identifying information is transmitted with the survey results. Please answer all of the questions as accurately as possible.

Multiple Attempts:

Not allowed. This Survey can only be taken once.

Force Completion:

This Survey can be saved and resumed later.

Question 1

What type of computer is your primary computer?
Choose one from the list.

- A. Desktop Computer
- B. Laptop Computer
- C. Both Desktop and Laptop computers

Question 2

What type of computer operating system did you use most often when working on this class?

- A. Windows based computer
- B. Mac OS based Computer
- C. I use a combination of Windows and Mac OS computers
- D. Other

Question 3

Please check any of the places that you have worked on this course using a computer? *Please check all that apply*

- A. Home/dorm
- B. Library or other public computer facility
- C. School Computer Lab
- D. Public facility such as a Starbucks or other wireless hotspot

Question 4

Which of the following browsers are installed on the computer(s) that you use for this class? *Check all that apply*

- A. Netscape Navigator
- B. Microsoft Internet Explorer (IE)
- C. FireFox
- D. Safari
- E. Other

Question 5

Which of the following browsers do you use most often for this class? *Choose only one from the list*

- A. Netscape Navigator
- B. Microsoft Internet Explorer (IE)
- C. FireFox
- D. Safari
- E. Other

Question 6

What type of internet connection do you use most often when working on this class?

- A. Dial-up (modem)
- B. Highspeed connection such as cable or DSL
- C. Wireless
- D. Don't know

Question 7

How many hours do you generally spend per week on this course?

- A. 5 or less hours
- B. 6 to 10 hours
- C. 11 to 20 hours
- D. more than 20 hours

Question 8

Which choice best fits how you read course related documents?

- A. I generally print them then read them
- B. I generally read them on the screen

Question 9

Including this course, how many completely online courses have you taken at the college or university level.

- A. 1 course
- B. 2 to 4 courses
- C. 5 or more

Question 10

How often do you use an online chat program such as AIM or iChat to communicate with others?

- A. Never
- B. Occasionally
- C. Frequently

Question 11

Do you participate in any Web Blogs?

- A. Never
- B. Occasionally
- C. Frequently

Question 12

Do you participate in any List Serves?

- A. Yes
- B. No
- C. Not sure

Question 13

Are you a GIT Major?

- A. Yes
- B. No
- C. Unsure

Question 14

What is your class rank?

- A. Student
- B. Graduate Student
- C. Unsure

Question 15

Gender:

- A. Male
- B. Female

Question 16

Please take some time to list the things that you liked best about ANY of your online courses.

Question 17

Please take sometime to list some of the thing you disliked about ANY of your online courses.

Appendix B: Chat Room Protocol

Chat Room Protocols

Many of you may participate in online chatting such as AIM. This is typically an fairly unorganized form of communication where anyone can interject at any time. This does not work well for chats designed to facilitate team work. I have created this list of suggested chat room protocols to help maximize the communication process without significantly impacting your ability to communicate freely.

Prepare for your chat ahead of time:

- Use the Group discussion board to communicate with group members.
Do not use email as there is not common record of the communication.
- Choose a team member to be the Group Moderator. The instructor may choose to assign graduate students the task of being Group Moderators
- Select a time that is convenient for the chat. A list of possible chat times are posted in the module folder. I recommend that each team member list the times that work for them in the discussion board and the team moderator pick the best one. If you can not all agree on a time contact the instructor by email immediately. Participation of all group members is mandatory.

Log in early:

- Log into the Group discussion board 5 to 10 minutes before the chat is to start. (Groups menu --> Group Number folder --> Collaboration)
- Take time to introduce yourself to each other that way you have that out of the way when you begin to record the chat.

Chat Protocols:

- Only one person at a time can have the floor. Online class related chats should be conducted similarly to a classroom discussion. One person should speak at a time. We will refer to this as having the “**floor**.”

- The Chat Moderator should be responsible for controlling the “flow” of conversation.
- The Chat Moderator should begin the conversation by introducing the topic or posing a question. Other group members should respond to the question one at a time.
- The Chat Moderator is responsible for starting and stopping the recording. The Chat monitor should also be responsible for naming the Chat appropriately so the instructor can find it.

Chat Symbols:

Only one person at a time can have the floor. Please use the following symbols to help facilitate smooth communication

- % member name - should be used to yield the floor to someone else.
- & - Enter a single ampersand (&) if you want to request the floor from someone else. Then wait for the floor to be yielded to you. If you want to direct your question comment to someone specific. Type the & followed by the person’s name.
- # - Use the pound sign (#) at the end of your statement to indicate that you are done. This allows you to take time to think and type.

It also allows you to make a statement that takes more than one entry screen.

- --> - use this symbol if you must step away from the screen.
- <-- - use this symbol when you return.

Other Guidelines:

- If you loose connection with the server. Do your best to reconnect as quickly as possible. Once you reconnect do not interrupt by integrating comments about what happened just rejoin “quietly.”
- If the moderator loses his/her connection have a back up person who will take over until the moderator is able to return.
- Avoid idle chit chat. You are welcome to chat with other class member on your own.
- All group members are expected to participate actively in the chat. Don’t waste chat time with comments like - Ditto, I agree. Active participation requires well thought out comments and questions. Each group member is graded separately on their participation.

This is a refereed article.

The Impact of a Visual Communications Course on Students Who Had Not Been Previously Exposed to Graphic Design

by *Monika Zarzycka, M.S., and Jerry J. Waite, Ed.D., University of Houston*

Abstract

Individuals who are (or will be) involved in any kind of business should be required to develop visual communication skills. Visual literacy is needed in designing business presentations, corporate communications, and company websites. For this reason, an introductory course, GRTC 3353, in visual literacy is offered to students in the Information and Logistics Technology Department at the University of Houston. The GRTC 3353 course is especially geared towards people who have no design skills or experience. Over the course of one semester, students learn concepts such as graphic design principles, typographic specifications, and color theory using Microsoft Word.

In a preliminary study constructed to assess the effectiveness of the GRTC 3353 course, two art directors, a print products manager, and a graphic designer from the Fogarty Klein Monroe (FKM) Agency compared and evaluated students' projects designed at the beginning of the semester and similar projects completed at the end of the semester. This paper examines the details and outcome of this study.

Introduction

Individuals in technical or management related careers are often placed in positions in which creative design skills are needed. Visual communication skills are required in designing PowerPoint presentations, company newsletters, corporate communications, business cards, letterheads, and corporate websites. Many individuals are never taught design concepts, however, and are therefore unable to make persuasive visual projects (such as visually compelling PowerPoint presentations).

The Information and Logistics Technology (ILT) Department at the University of Houston (UH) resolved the matter of visual communications illiteracy by offering a visual communications course especially geared towards people who have no design skills or experience. GRTC 3353 (Visual Communications Systems) is an introductory course that is required of all students in the UH ILT department.

In GRTC 3353, students are taught, among other things, principles of design, color theory, and typographic specifications. Since the majority of the students are not graphic designers, they are also taught basic design concepts using Microsoft Word or Microsoft PowerPoint. Students are advised that these programs are not recommended as professional graphic design applications but are acceptable as in-office applications. The advantage of using Microsoft Word or PowerPoint over professional design programs, such as Adobe InDesign, is that students learn visual communications concepts without spending excessive class time learning new software programs that many of them would never use after the course.

During the course, students make simple invitations, letterheads, and logos. Assignments are designed to familiarize students with design concepts introduced during lecture and to evaluate their ability to apply design concepts to their own work.

To assess the effectiveness of the GRTC 3353 course, a preliminary study was conducted in which student projects designed at the beginning of the semester were compared to similar projects completed at the end of the semester.

Importance of the Study

Business professionals should be visually literate (Sedlack et al, 2008). A basic knowledge of graphic design concepts helps people prepare visually appealing presentations, corporate documents, and websites. In order to introduce its students to visual design fundamentals, the UH ILT department requires students to take an introductory course in visual communications. This study assesses the GRTC 3353 course to determine if it effectively improves students' application of graphic design principles when they create documents of the type normally used in a business and personal settings.

The Statement of the Problem

The purpose of this research is to assess the effectiveness of the GRTC 3353 course by examining whether students' final projects showed improvement over their earlier work.

Research Questions

The study attempts to answer the following questions:

1. Did the GRTC 3353 course make any impact on student's use of typography?
2. Did the GRTC 3353 course make any impact on student's adherence to design principles?
3. Did the GRTC 3353 course make any impact on student's use of color?
4. Did the GRTC 3353 course prepare students to create more effective visual work at the end of the semester as compared to their skill-level at the beginning of the course?

Assumptions

This study is based on five assumptions. First, the researchers assumed that the students enrolled in the GRTC 3353 course had no previous experience in graphic design. Second, the researchers assumed that the students put an equal amount of effort into both projects that were evaluated. Third, the study assumed that the judges understood the objectives of the study and were able to follow instructions. Fourth, the researchers assumed that all the evaluation sheet responses were honest. Finally, the study assumed that all the judges had a working knowledge of visual communications.

Limitations

The researchers faced three limitations when conducting this study. First, the study was limited to the number of students enrolled in the GRTC 3353 course that was offered in Fall 2006. Second, there was no control group. Finally, the evaluations were completed by a single panel of four judges.

Review of the Literature

Visual communication skills are required for all business-oriented professionals. According to Sedlack, Shwom, and Keller (2008), "Effective visual communication is not optional for managers and business communicators; it is required." Visual literacy is required because of "globalization, increased computer usage, and

employee involvement in total quality improvement" (Weaver, 1999). Globalization requires people to communicate in a simple and common language, many times using symbols. Symbols allow for quicker and more effective communication than verbal language. Second, computers allow people to produce visual designs faster than any other tool. Using computers, professionals can illustrate complex and statistical ideas and present them as graphics. "Managers should communicate ideas at glance" (Weaver, 1999), because, according to Sedlack et al. (2008), people want to quickly read data documents, charts, image, and immediately find important information. Third, employee involvement in the total quality improvement of a business has put visual communication, such as statistical graphs, in front of nearly every employee (Weaver, 1999). Therefore, managers need to effectively communicate statistical information in visual form (flowcharts or pie charts, for example).

Display of visual data, however, is not limited to the use of symbols or charts. People come across visual displays everywhere—in newspapers and magazines, on television, in books, in travel guides, in instruction manuals, on signs, on computer screens, and even office walls. Since visual displays exist virtually everywhere, business professionals could be more effective if they become more familiar with graphics and acquire visual communication skills (Weaver, 1999). It is not productive for business professionals to prepare documents or presentations without having the necessary visual communication skills. At the very least, business writers should to learn how to "design documents and electronic presentations that are quickly understood; create graphs and tables that are easy to process" (Sedlack et al., 2008); integrate different design elements, such as diagrams, photos, and illustrations; and use color and typography to enhance the message and not divert from it (Sedlack et al., 2008).

Managers and high level business professionals should not be the only ones to learn visual communication, however. Employees should learn these skills as well. The ability to communicate well visually will help people learn to better perform their jobs (Lohr, 2003). According to Weather (1999), this does not necessarily mean that all employees need to learn how to create graphics, but all employees should know how to read such images. Weather also points out that many people were not taught at school how to interpret graphics, and as a result, many

problems occurred. “According to the National Association of Manufacturers (NAM) survey issued in November 19, 1997, 48 percent of the respondents said that too many of their workers lack the ability to read and interpret drawings, diagrams, and flow charts.” In addition, “73 percent said that they either cannot improve productivity or upgrade technology due to skill deficiencies” (Weaver, 1999).

Lohr (2003) agrees with Weather (1999) that one of the biggest causes of visual illiteracy is that people are not educated in the area of visual design. “Most people receive years of training in verbal communication but receive almost no assistance in the art and science of communicating visually” (Lohr, 2003).

Methodology

Students in GRTC 3353 course completed pre-course and post-course projects based upon an identical set of instructions. At the end of the semester, a panel of four judges (two art directors, a print products manager, and a graphic designer from the FKM Agency) evaluated both sets of projects.

Participants

The participants in this study were 23 students enrolled in the introductory visual communications course (GRTC 3353). Only one student majored in graphic design or a related area. Based on that student’s score on the pre-course and post-course, it can be said that the student did not have previous design experience. Sixteen (70%) of the students majored in Technology Leadership and Supervision, four (17%) majored in Logistics Technology, and two (8%) other students majored in other fields unrelated to graphic design.

Course

GRTC 3353 is an introductory course on the topic of visual communications. In the course, students are introduced to principles of graphic design, typography and how to work with type, scanning and digital photography, color theory and use, newsletter and newspaper design, identity and advertising design, and new media design.

The GRTC 3353 course is divided into weekly two-hour lectures and three-hour lab sessions. In the lecture, stu-

dents are taught the principles of visual communication. To help them grasp newly learned concepts and material from the assigned book chapters, students are also given homework and weekly quizzes, administered using WebCT. In the lab, students are provided with hands-on experiences that correspond with the topics discussed in the lecture. After students complete a few small assignments, they are given a bigger project. Small assignments are based on specific lecture topics, while bigger projects are based on several combined lecture topics.

Materials for the GRTC 3353 course (including the syllabus) can be found on the class website: <http://graphics.tech.uh.edu/courses/3353/>

Pre-course Assignment

Students, at the beginning of the class of the Fall 2006 semester, were given a project to design—a wedding invitation. Participants were provided with a MS Word file that contained the description of the client and of the wedding couple and the text for the invitation. Students were asked to format the text and turn it into an invitation. No additional instructions were given.

Post-course Project

The same students who participated in the pre-course were given the same file to create the wedding invitation in the end of the semester. Participants received exactly the same text and instructions for this invitation that they received for the pre-course project.

Exhibition

The participants’ submissions for these two projects were judged during the GRTC annual holiday party. The holiday party is a departmental tradition, during which students gather with their family, friends, faculty, and college staff.

During the holiday party, participants’ projects were displayed in the lab for students to peruse, for all guests to view, and for the judges to assess.

All judges came to the exhibition. First, judges were briefed on the objectives of the study. Next, the judges were given a 12-page evaluation sheet to complete anonymously.

Judges

The judges were two art directors, a print products manager, and a graphic designer chosen by the Fogarty Klein Monroe (FKM) Agency, the largest advertising firm in Houston.

Judging - Process

At the beginning of the semester, the Print Products Manager from the FKM Agency was contacted by the researcher and asked to select three to five graphic designers to act as judges. Four designers were willing to participate in the study.

EVALUATION SHEET					
Objective All the students are non-designers. Their goal was to design a wedding invitation for a hypothetical client.					
Instructions Please rate each work (wedding invitation) according to the criteria stated below and circle the number that best describes your response. Each response should be marked on a scale 1 to 5 (1 = ineffective, 2 = slightly effective, 3 = moderately effective, 4 = effective, 5 = extremely effective)					
The number on the survey (Work 1) corresponds with a number on the invitation.					
Survey: WORK 1*** (1 = ineffective, 2 = slightly effective, 3 = moderately effective, 4 = effective, 5 = extremely effective)					
1. Rate the non-designer's use of typography	1	2	3	4	5
2. Rate the non-designer's adherence to design principles (balance, emphasis, unity, white space)	1	2	3	4	5
3. Rate the non-designer's use of color	1	2	3	4	5
4. Do you consider this work to be an effective piece? (response)	Yes	or	No	(circle your response)	
*** Please note that the number on the survey corresponds with a number on the invitation.					
Survey: WORK 2*** (1 = ineffective, 2 = slightly effective, 3 = moderately effective, 4 = effective, 5 = extremely effective)					
1. Rate the non-designer's use of typography	1	2	3	4	5
2. Rate the non-designer's adherence to design principles (balance, emphasis, unity, white space)	1	2	3	4	5
3. Rate the non-designer's use of color	1	2	3	4	5
4. Do you consider this work to be an effective piece? (response)	Yes	or	No	(circle your response)	
*** Please note that the number on the survey corresponds with a number on the invitation.					
Survey: WORK 3*** (1 = ineffective, 2 = slightly effective, 3 = moderately effective, 4 = effective, 5 = extremely effective)					
1. Rate the non-designer's use of typography	1	2	3	4	5
2. Rate the non-designer's adherence to design principles (balance, emphasis, unity, white space)	1	2	3	4	5
3. Rate the non-designer's use of color	1	2	3	4	5
4. Do you consider this work to be an effective piece? (response)	Yes	or	No	(circle your response)	
*** Please note that the number on the survey corresponds with a number on the invitation.					

Figure 1— Representation of the Evaluation Sheet

A month before the exhibition, the FKM's Print Products Manager was contacted about the date and time of judging. The representative was responsible for contacting the four judges.

A week before judging, the researcher took note of which project belonged to which student, but the judges were not given that information. The researcher then collected all pre-course and post-course projects, shuffled them, and numbered them randomly.

Evaluative Instrument

The instrument used for this study was an evaluation sheet used to measure the effectiveness of each project. The evaluation sheet included four qualitative items for each project. Judges used a five-point Likert Scale to judge three questions related to the participants' use of typography, adherence to design principles, and use of color. The fourth item asked judges to mark either "Yes" or "No" if they considered the work to be an effective piece of visual communication. Figure 1 depicts the evaluation sheet.

Data Analysis

This study is descriptive in nature; therefore, statistical data analysis involved simple tabulations and the presentation of counts, percentages, figures, and tables. A comparison between responses was conducted by examining individual answers and by placing each answer in either the "pre-course" or "post-course" cluster.

Both the "pre-course" and "post-course" projects were gathered into two groups and analyzed. Each of the judge's responses was separated by question and placed in either the "pre-course" or "post-course" cluster.

Results and Presentation of Data

The data for the study was collected from the evaluation form responses that were completed by the four judges. Judges evaluated the pre-course and post-course projects of 23 students (46 total pieces). All of the judges' responses were then compared by constructing contingency tables of "pre-course" and "post-course" clusters, in which all of the responses for each question were separated and compared. To eliminate bias, the researchers did not participate in judging.

One of the judges did not answer any of the questions for one of the post-course entries. Thus, the results might have been slightly different.

Summary of Research Questions

The following table shows average scores of the four judges' responses of each question.

Pre-Course and Post-Course Results		
Question	Pre-Course Scores	Post-Course Scores
1	2.36	3.14
2	2.09	3.08
3	2.21	2.92
4	34.78%	80.43%

Note: Questions 1 through 3 are based on 5-point Likert Scale, with 5 being the highest and 1 the lowest. Question 4 is based on percentage of the "Yes" responses.

Table 1— Pre-Course and Post-Course Results

Question 1: Did the GRTC 3353 course make any impact on student's use of typography? Yes. Out of a possible five points on the Likert Scale, the average evaluation by the judges of the pre-course entries was 2.36 and post-course entries 3.14. Table 1 illustrates the results.

Question 2: Did the GRTC 3353 course make any impact on student's adherence to design principles? Yes. Out of a possible five points on the Likert Scale, the average evaluation by the judges of the pre-course entries was 2.09 and post-course entries 3.08. Table 1 illustrates the results.

Question 3: Did the GRTC 3353 course make any impact on student's use of color? Yes. Out of a possible five points on the Likert Scale, the average evaluation by the judges of the pre-course entries was 2.21 and post-course entries 2.92. Table 1 illustrates the results.

Question 4: Did the GRTC 3353 course make an impact on the effectiveness of students' work at the end of the semester as compared to similar project completed before taking the course? Yes. The judges rated 34.78% of the pre-course projects and 80.43% of the post-course projects as effective. Table 1 illustrates the results.

Conclusions and Recommendations

The study showed that the GRTC 3353 course had an impact on students' ability to produce more effective projects at the end of the semester as compared to the beginning of the semester. Of note, more than 80% of the students' final projects were judged effective as opposed to only 34.78% of students' initial projects.

Recommendations for Future Research

Due to limited number of participants, it is recommended that future research include a larger sample. It is also recommended that the participants are compared to a control group of individuals who have not taken a visual communication course at all. Another recommendation is to have a larger panel of judges, all of whom should be professional graphic designers. It is also recommended to administer a similar study to both online and face-to-face sections of the same course and compare the results. A final recommendation is to administer a similar study to

students who are enrolled in the same course but have different lab instructors.

Bibliography

Lohr, Linda. (2003). *Creating Graphics for Learning and Performance. Lessons in Visual Literacy*. Upper Saddle River, NJ: Pearson Education, Inc.

Sadlack, R. P., Jr., Shwom, B. L., Keller, K. P. (2008). Graphics and Visual Communications for Managers. In J. S. O'Rourke IV (Ed.), *Managerial Communicator Series* (Part 4). Mason, OH: Thompson.

Weaver, Marica. (1999). *Visual Literacy: How to Read and Use Information in Graphic Form*. New York: New York LearningExpress.

This is a refereed article.

How to Make Risky Decisions Visually

by Robert Bordley, Ph.D., University of Michigan, Ann Arbor

Abstract

Individuals make many possibly-risky decisions. These include investing, gambling, buying insurance, deciding among risky medical procedures, or choosing a career. There is a logically rigorous theory for making such decisions. But applying this theory currently requires access to experts with mathematical skills. This paper presents an alternate, purely visual, approach toward applying decision theory that eliminates the need for any mathematical calculations.

Introduction

Visual imagery is used to communicate both data and the results of an analysis (Tufte, 1992, 1997). Similarly, risk communication (Covello et al, 1996; Morgen & Lave, 1990) uses visual imagery to publicly communicate the recommendations from expert risk analyses (even though the analyses remain technical). This paper will go beyond risk communication in making the entire analysis (as well as the data and recommendations) visual. This creates a visual non-mathematical language (consistent with Lester's (2006) nonverbal language in visual messages) where the mathematics of problem formulation and solution are replaced by the drawing and coloring of a diagram.

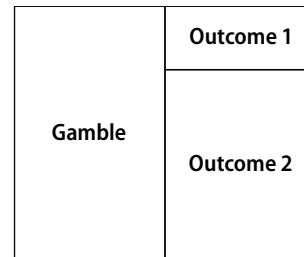
The first section presents the visual representations central to this approach. The second section uses these representations to create a visual procedure for making risky decisions. The paper concludes by discussing areas for further research.

Elements of the visual approach

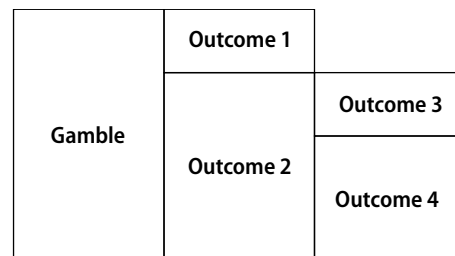
Visually communicating uncertainty using size

A gamble is represented as a rectangle followed by two adjacent rectangles describing the possible outcomes of this gamble. The relative size of the adjacent rectangles for each outcome describes the chance of that outcome occurring. Thus, the figure below indicates that the gamble is likely to lead to OUTCOME 2 but does have

some smaller chance of leading to OUTCOME 1. If an imaginary dart were thrown at the two rectangles adjacent to the GAMBLE rectangle, the odds of the dart landing in the top rectangle (as opposed to the bottom rectangle) reflects the odds of having OUTCOME 1 occur (as opposed to OUTCOME 2.)



Now suppose OUTCOME 2 was another gamble which was likely to lead to some payoff called OUTCOME 4 but had a small chance of leading to OUTCOME 3. To show that OUTCOME 2 is a gamble, the previous diagram would be replaced by the figure below.



Visually communicating the desirability of gambles using color

While all outcomes may be affected by future uncertainties, those outcomes which can be considered relatively certain (for the purposes of the decision being made) are called consequences. Use the terms BEST POSSIBLE (and WORST POSSIBLE) to describe the best possible (and worst possible) consequence that might arise from any of the decisions being considered. A basic gamble is defined as a gamble with some chance of leading to BEST POSSIBLE (and which leads to WORST POSSIBLE otherwise.) The figure on the next page presents a specific basic gamble called RISK.

Risk	Best Possible
	Worst Possible

The rectangle for the BEST POSSIBLE outcome is arbitrarily colored white and the rectangle for the WORST POSSIBLE outcome is arbitrarily colored black. Coloring the previous figure yields the new figure below.

Risk	Best Possible
	Worst Possible

The next step is to color the RISK rectangle in this figure. To do so, imagine that the BEST POSSIBLE and WORST POSSIBLE rectangles are cans of paint with the volume of each can being proportional to the rectangle's size. Imagine that both cans are emptied into the can represented by the RISK rectangle. This mixing of paints colors the RISK rectangle with the dark grey color shown to the right. Note that changing the probability of the gamble leading to BEST POSSIBLE adjusts the relative heights of the BEST POSSIBLE rectangle and WORST POSSIBLE rectangle which, in turn, adjusts the color assigned to the RISK rectangle. This mixing procedure can assign colors to all possible basic gambles.

Risk	Best Possible
	Worst Possible

For any consequence other than BEST POSSIBLE and WORST POSSIBLE, first identify a basic gamble which is just as desirable as that consequence (possibly by compar-

ing the consequence with many basic gambles (Spetzler & von Holstein, 1975)). Then the rectangle for this consequence is given the same color as the rectangle associated with the gamble. This procedure allows all CONSEQUENCE rectangles to be colored.

To color a gamble leading to arbitrary consequences, consider the gamble shown below leading to consequences, numbered 1 and 2.

Risk	Consequence 1
	Consequence 2

Since both consequences are just as desirable as their corresponding basic gambles, the corresponding gambles can be added to the right hand side of the figure (as shown below.)

Risk	Consequence 1	Best Possible
		Worst Possible
	Consequence 2	Best Possible
		Worst Possible

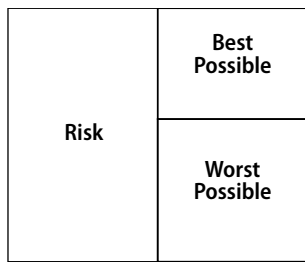
Since a decision's desirability is determined by its final payoffs, the stack of intermediate outcomes can be erased, which leads to the figure below.

Risk	Best Possible
	Worst Possible
	Best Possible
	Worst Possible

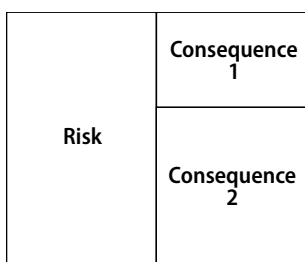
Rearranging the order in which the rectangles in the rightmost column are listed gives the figure on the following page.



Merging the two adjacent BEST POSSIBLE rectangles and the two adjacent WORST POSSIBLE rectangles creates the basic gamble below. In other words, gambles involving arbitrary consequences can be redrawn as basic gambles. As a result, the RISK rectangle can be colored using the procedure for coloring basic gambles.

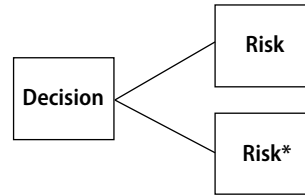


To present a faster, but equivalent, way of coloring gambles involving consequences, consider the RISK rectangle (shown below.) Color the rectangles for consequences 1 and 2. Just as was done for basic gambles, treat these two rectangles as cans of paint and “pour” them into the RISK rectangle. This creates the appropriate color for the RISK rectangle. This “mixing” procedure also applies to gambles with more than two outcomes.

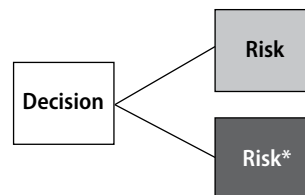


Visually describing decisions

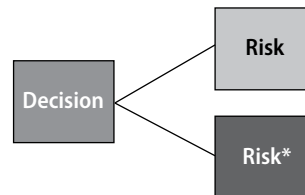
To distinguish between a decision and a gamble, draw a decision as a rectangle connected by arcs to the possible choices for the decision. (See figure at the top of next column.)



As the next figure shows, the outcomes of the decision are then colored. If a decision were like a risk, the decision rectangle would be colored by mixing colors from the RISK rectangle and the RISK* rectangle.



But in a decision, the individual can choose which outcome happens. A rational individual will choose the better outcome (which has the lighter color.) As a result, the color of the DECISION rectangle will be the same light grey color of the RISK rectangle (shown below.)



The next section illustrates this purely visual approach on the two main kinds of examples used in quantitative MBA and senior undergraduate engineering classes.

Demonstration of visual decision analysis

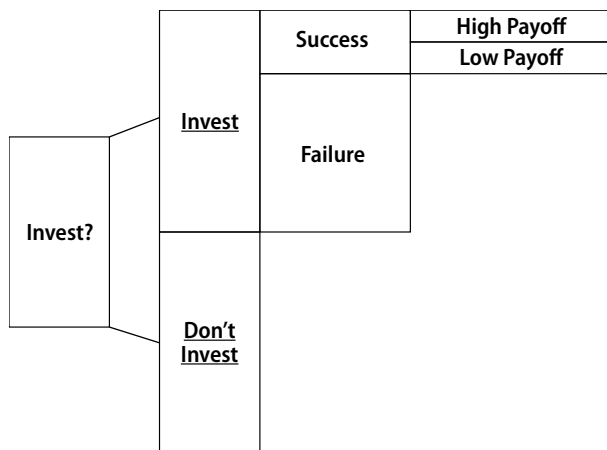
A textbook decision problem

Consider a risky project with a small chance of achieving its goals and a large chance of failure. If the project achieves its goals, there is an even chance of the project having a high payoff versus a lower payoff. A manager must decide whether to invest resources in the project. (Payoffs and resources could be non-monetary as well as monetary.) Thus:

- (1) The manager is first confronted with a decision;

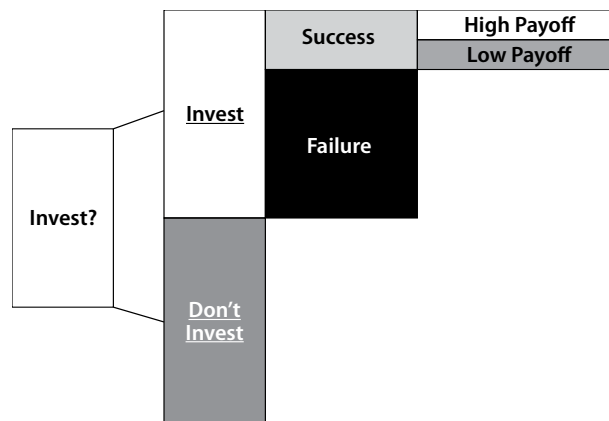
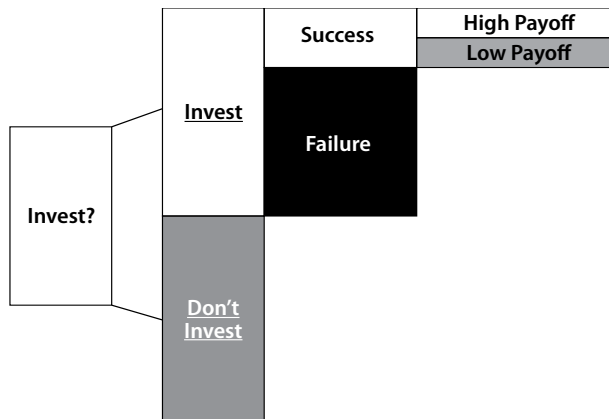
- (2) The manager makes a decision about whether to invest in the project;
- (3) If the manager invests, the manager later learns whether the project succeeded; and
- (4) If the project succeeds, the manager learns whether the payoffs are high or low.

To construct the visual representation, draw a sequence of stacked rectangles, in the order in which the corresponding outcome occurs, with the relative size of a rectangle within a stack describing the chance of the event occurring (as shown below.)

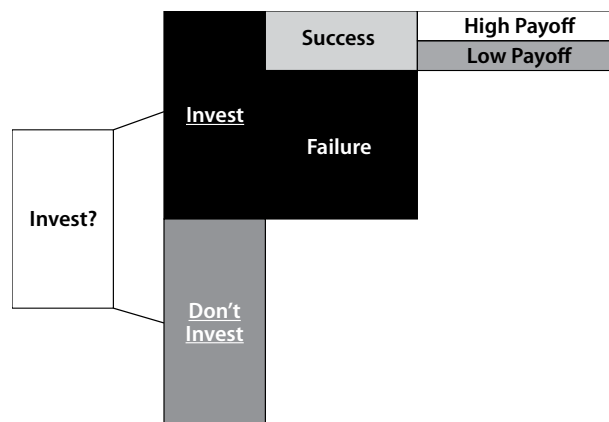


To determine the best decision, the manager first assesses the desirability of the rightmost outcomes: DON'T INVEST, FAILURE, LOW PAYOFF and HIGH PAYOFF. The best outcome, HIGH PAYOFF, has its rectangle colored white while the worst outcome FAILURE, has its rectangle colored black. Other outcomes are given intermediate colors. See the figure at the top of the next column. The next step is coloring the remaining rectangles.

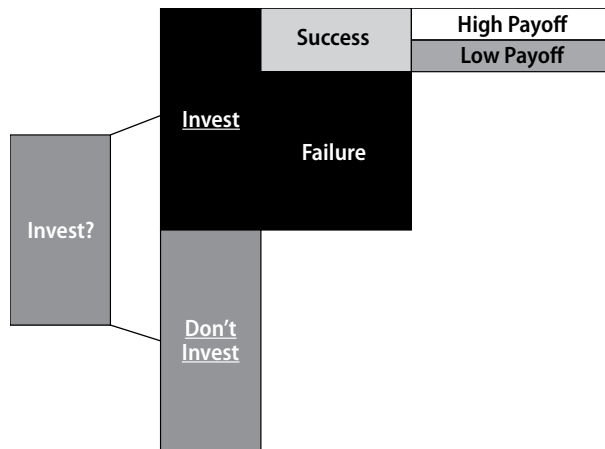
The color for the rectangle INVEST? cannot be specified immediately since it is followed by the rectangle, INVEST, which has not been assigned a color. But a color can be specified for the rectangle, SUCCESS, since it is followed by two rectangles, HIGH PAYOFF and LOW PAYOFF, which have been colored. Since the two rectangles are outcomes of risk, the success rectangle is colored by mixing the colors of the HIGH PAYOFF and LOW PAYOFF rectangles. This gives the second figure in the next column.



Now consider the remaining uncolored rectangles. The INVEST rectangle is now followed by two colored rectangles. Since the two colored rectangles, FAILURE and SUCCESS, are risks, the INVEST rectangle can be colored by mixing their colors. Since the FAILURE rectangle is bigger than the SUCCESS rectangle, this gives the figure below.



This leaves only one remaining uncolored rectangle, INVEST? Since this rectangle is now followed by two colored rectangles, INVEST and DON'T INVEST, which are decision outcomes, it is rational to make the decision DON'T INVEST since it has the lighter color and color INVEST? with this lighter color. (See figure below).



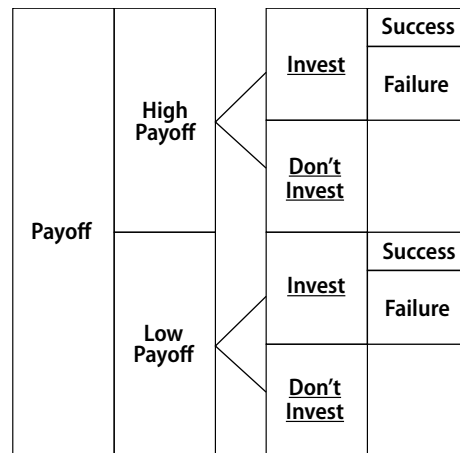
A textbook decision problem with perfect information

For a more complicated example, suppose the previous problem is modified so the manager first learns about the outcome of one of the uncertainties (i.e., the potential payoffs of a successful project) before making a decision. In this case:

- (1) The manager begins with uncertainty about the payoff of the potential project;
- (2) The manager learns what the potential payoff of a successful project could be;
- (3) The manager decides whether to do the project; and
- (4) The manager then learns whether the project was successful.

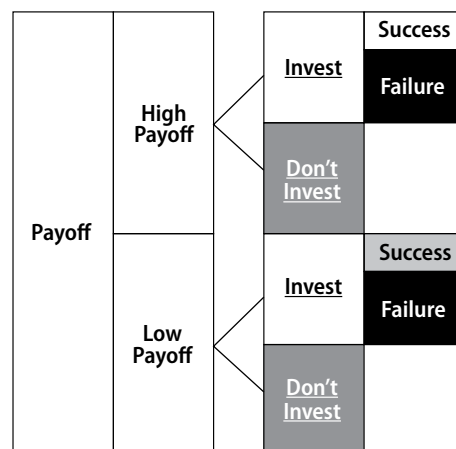
The visual formalization of this problem is shown at the top of the next column. As before, HIGH PAYOFF and LOW PAYOFF have the same-sized rectangles while the FAILURE rectangle is much larger than the SUCCESS rectangle.

The next step involves coloring the rightmost rectangles, using information from the original diagram in the previous section. Two of the end-rectangles in this

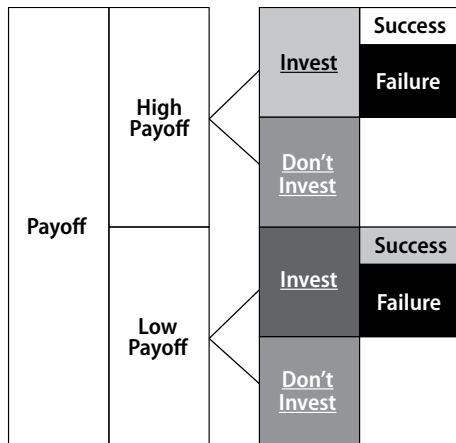


new diagram, DON'T INVEST and FAILURE, were end-rectangles in the original diagram. To be consistent with this original diagram, dark grey is used to color both of the DON'T INVEST rectangles and black to color both of the FAILURE rectangles.

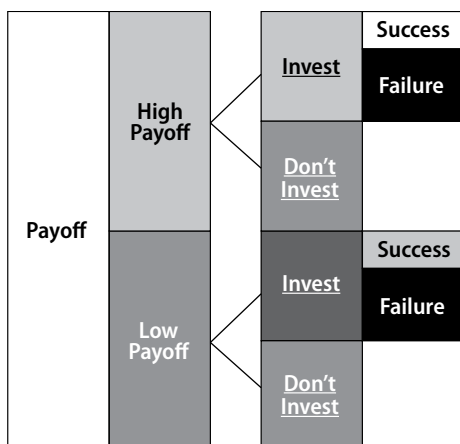
But the outcome, SUCCESS, was not an end-rectangle in the original diagram. To determine its color, note that the uppermost success event presumes a high project payoff. Since a successful project with a high project payoff led to a white rectangle in the original diagram, this uppermost success rectangle is colored white. In contrast, the lowermost success event presumes a low project payoff. Since a successful project with a low project payoff led to a light grey rectangle in the original diagram, light grey is used to color this second SUCCESS rectangle. (See figure below.) The colors assigned to these end-rectangles will now be used to infer colors for all the other rectangles.



The next rectangles that can be colored are the INVEST rectangles which, in both cases, are followed by equally sized SUCCESS and FAILURE chance rectangles. Mixing colors appropriately gives the figure below.

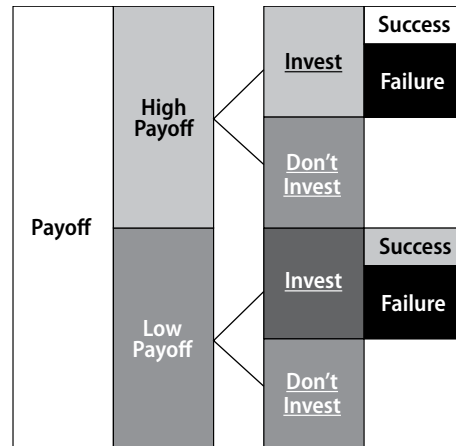


The next step is coloring the HIGH PAYOFF rectangle which borders two decision rectangles (italicized and underlined). Since the lighter rectangle is INVEST, the manager decides to invest (if the manager learns the payoff is high) and colors the HIGH PAYOFF rectangle light grey. (See figure below.) To color the LOW PAYOFF rectangle, note that the lighter colored rectangle is DON'T INVEST. So the manager decides not to invest (if the manager learns the payoff is low) and colors the LOW PAYOFF rectangle an intermediate dark grey.

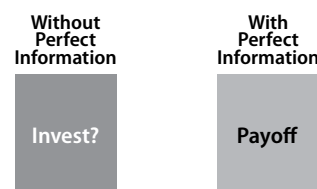


Finally the project PAYOFF rectangle is colored by mixing the color of the two chance rectangles, HIGH PAYOFF and LOW PAYOFF. (See figure in the next column.) Note that the

manager only changes the original decision (to not invest) if the information indicates the project payoff is high.



Now compare the starting rectangle for the original problem (without perfect information) and this modified problem (with perfect information.) Note that the rectangle for the problem with perfect information is lighter indicating that it is more desirable. To quantify how much more valuable the second problem is, suppose the problem were modified by requiring the manager to pay a fee for perfect information. Incorporating this fee would make all the consequences of the modified problem less desirable and thus would darken all the end-rectangles. This modified problem could be solved and a new color attached to the starting rectangle with the fee for perfect information. When the fee is large enough, the color of the starting rectangle will match the color of the original problem. The fee will represent the value of perfect information.



Conclusions

Risk has long been a key factor in making decisions (Bernstein, 1966). But a rigorous theory of risky decision making (von Neumann and Morgenstern, 1944) and procedures for its application (Raiffa, 1968; Howard, 1966) only emerged in the twentieth century. While actively used (Keefer, Kirkwood and Corner, 2004;

Cantor, 2004), these procedures require mathematics which makes them less accessible to many people (Brown, 2005). To address this problem, this paper presents an alternative, completely visual, procedure for applying decision theory.

This new visual approach is appealing because:

- (1) It requires much less mental processing than symbolic reasoning (Hardt, 1990);
- (2) It is more familiar since most people live in a visually intensive world;
- (3) Many exemplary decision makers (Klein, 1993) decide without mathematics;
- (4) Today's children need to learn decision making skills early (Marks, 2004); and
- (5) Individuals without formal mathematical training (or access to trained consultants) cannot easily apply the mathematical approach to decision theory.

Nonetheless the proposed visual procedure could still be improved. For example, the approach still uses words to label outcomes. It also only uses three visual cues: relative darkness, relative height and the sequence in which rectangles are arranged. It makes no use of the richness of the color scale, the width of each stack, or other visual cues.

The author hopes this paper encourages further work on integrating principles of visual communication into visual decision making procedures.

References

- Bernstein, P. (1996) *Against the Gods: The Remarkable Story of Risk*. New York:Wiley.
- Brown, R. (2005). *Rational Choice and Judgment*. New Jersey: Wiley.
- Cantor, S. (2004). Clinical Applications in the Decision Analysis Literature. *Decision Analysis*, 1.1.
- Covello, V., P. Slovic and D. von Winterfeldt. (1986). Risk Communication: A Review of the Literature. *Risk Abstracts*. 3(4), 172-182.
- Fisher, A. (1991). Risk Communication Challenges. *Risk Analysis*. 11,173-179.
- Hardt, Hanno. (1991, April). Words and images in the age of technology. *Media Development*. Vol. 38, pp. 3-5.
- Howard, R. (1966). Decision Analysis: Applied Decision Theory. In Hertz, D. & Melese, J.(ed). *Proceedings of the 4th International Conference on Operational Research*. New York: Wiley, 55-71.
- Keefer,D., C. Kirkwood, J. Corner (2004). Perspective on Decision Analysis Applications, 1990-2001, *Decision Analysis*.1,1.
- Klein, G., Orasanu, J., Calderwood, R., and Zsombok, C. E. (1993) *Decision Making in Action: Models and Methods*. New Jersey: Ablex Publishing Co.
- Lester, Paul Martin. (2006) *Visual Communication Images with Messages 4th Edition*. Belmont, CA: Wadsworth Publishing Company.
- Marks, D. (2004). Not Making Foolish Decisions. *Home Educator's Family Times*.12,3.
- Morgan, M. and L. Lave(1990). Ethical Considerations in Risk Communication Practice and Research. *Risk Analysis*. 10,355-358.
- Raiffa, H. (1997) *Decision Analysis: Introductory Lectures on Choices under Uncertainty*. Massachusetts: Addison-Wesley.
- Spetzler, C. and S. von Holstein (1975). "Probability Encoding in Decision Analysis." *Management Science*. 22, 340-352.
- Tufte, E. (1992). *The Visual Display of Quantitative Information*. Graphics Press.
- Tufte, E. (1997a). *Visual Explanations—Images and Quantities, Evidence and Narrative*. Connecticut: Graphics Press.
- von Neumann, J. and O. Morgenstern (1944). *Theory of Games and Economic Behavior*. Princeton, New Jersey: Princeton University Press

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The Applications and Services of Digital Contents—A Case Study of Academy–Industry Cooperation

by Yung–Cheng Hsieh, Ph.D., & Hui–Wen Cheng, National Taiwan University of Arts

Introduction

In the digital era, countries all over the world devote time to digitizing their cultural treasures and heritage. By means of digitalization, cultural heritage can be preserved and utilized. The purposes of the digital archive programs in Taiwan in the very beginning were only for culture preservation, exchange, and sharing. With the advanced technical development of digitalization, the government then put more emphasis on applications of the digitized content. It would be a waste if digitized content is not fully utilized, such as turning the digitized raw materials into learning and educational databases, publications, and other items.

Background of the Study

As digitization has become part of peoples' lives, Taiwan's Government Information Office has been working on the promotion of "digitized Taiwan." This project aims to preserve the rich cultural resources of Taiwan through digitization, through two major projects: the National Digital Archives Program from the National Science Council (NSC) and the National Repository of

Cultural Heritage from the Council for Cultural Affairs (CCA). The National Digital Archives Program, launched in January 2002, can be divided into Content Development Division, Research and Development Technology Division, Applications and Services Division, Training and Promotion Division, and Operations Management Division. Among the five divisions, the Applications and Services Division, which serves as a bridge between content holders and digital industries, especially focuses on the collaboration between the academic sector and the industrial sector. It developed a five-year strategy to fulfill its mission of applying digital archives (see Figure 1) and encourages research institutes and organizations to participate in this academy-industry cooperation plan. A lot of valuable documents and images, including artworks, have been digitized and applied to create new values through various seed projects during recent years (National Science Council, 2006).

Purposes for the Study

With the advanced technical development of digitalization, the government has put more emphasis on value-

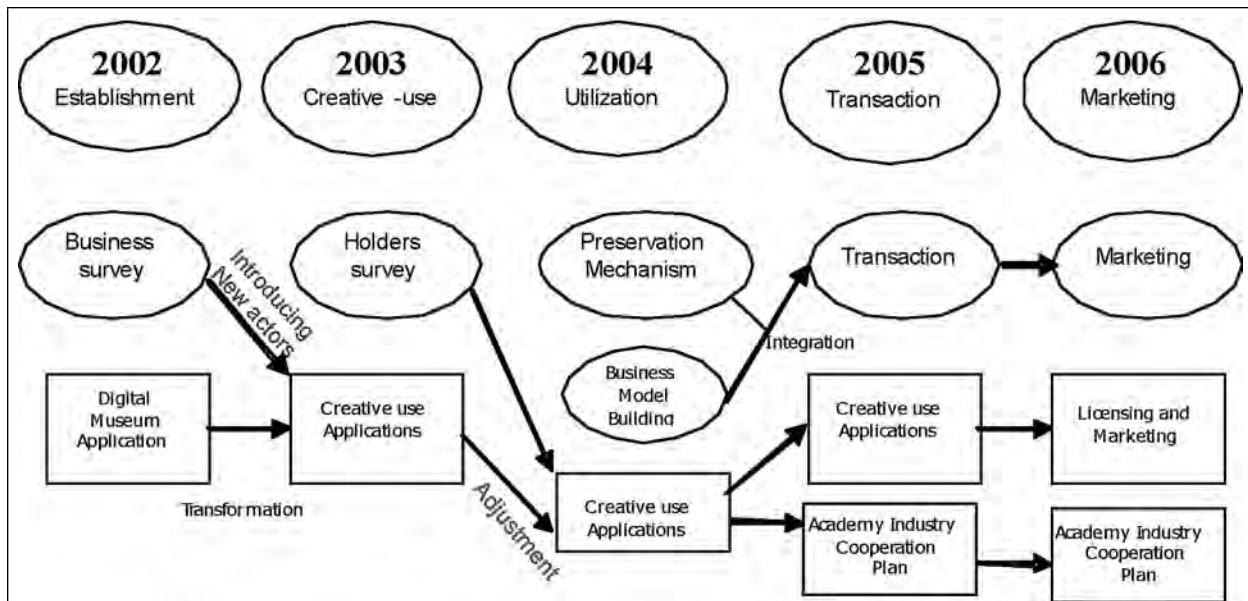


Figure 1. Five-Year Roadmap and Strategic Plans

Source: National Digital Archives Program, Introduction of Applications and Services Division. Retrieved April 18, 2007, from <http://aps.csie.ntu.edu.tw/eng/intro.html>.

added applications of digitized content. It would be a waste to not make the best use of digitized content, such as turning the digitized raw materials into learning and educational database, publications, and other commercial products.

The main purpose of this paper was to discuss the approaches of developing applications and services of digital contents from content holders such as museums, fine art museums, and artists. The paper demonstrates these approaches using the projects conducted by the authors in the past three years. In addition to culture preservation and sharing, this paper explores how to make the best use of vivid and rich digital content from various content holders for the purposes of education, learning, research, and commercialization based on an academy-industry cooperation model. Particularly, this article uses a project titled "The Promotion of Traditional Production Industry through Archived Artworks" as an example to illustrate the "academy-industry" cooperation model and how it develops value-added applications and services.

Methodology

The approaches of utilizing digital content to develop the applications and services were derived from the four projects which were subsidized by the National Digital Archive Program (NDAP) of the National Science Council (NSC) of Taiwan. These projects were conducted by the authors in the past three years. The titles of the projects and their introductions are:

- 1) **Plant Dye and Knitting Art Digital Learning and Added-Value Center (<http://www.ntua.edu.tw/~gca/nsc/plant.html>):** The purpose of study was to integrate most of the TCCCKM's (Taichung County Cultural Center Knitting Museum) archives and collections into a Plant Dye and Knitting Art Digital Learning and Value-Added Center. This center is a valuable resource for the academic, industrial, and business sectors. For the academic sector, the learning center integrates the latest technology developments and research into a digital learning environment for interested users. For the industry sector, the center provides a platform for related artist groups and industries to promote the development of new products and to design unique products and brands for specific marketing. For business, an online purchasing and bidding system establishes a network for artists and creators to sell their plant dye and knitting products (Hsieh, Wu, & Lee, 2006, pp. 117-120).
- 2) **Ju-Ming Digital Sculpture Zone and Added-Value Center (<http://www.ntua.edu.tw/~gca/nsc/juming.html>):** The main purpose of this project was to create a platform to enhance the sculpture arts, the heritage of sculpture knowledge, the cultivation of sculpture artists, the generalization and distribution of sculpture education and folks arts, the appreciation of arts, and aesthetics. Furthermore, this project was designed to construct a virtual creative culture park to assist artists for sharing and discussing sculpture related issues. This virtual park (website) is also accessible to the public to gain information and knowledge about sculpture arts and the aesthetic concepts of the founder of the Juming Art Museum. It is hoped that sculpture arts resources and heritage can be preserved and maintained through the establishment of this digital sculpture zone. Finally, the digital sculpture zone provides a trade platform for promoting creative sculpture merchandise and e-commerce application development.
- 3) **The Promotion of Traditional Production Industry Through Archived Artworks (<http://www.ntua.edu.tw/~gca/nsc/honggah.html>):** In this project, from digitizing artwork to establish an art licensing system, a model for the value-added applications and services was developed. The research team, ACT (Arts, Creativity, Technology) Media LAB in the Department of Graphic Communication Arts at National Taiwan University of Arts (NTUA) was responsible for planning and implementing the whole process. Hong-Gah Museum, as the content holder, provided their valuable digital contents, such as oil paintings, water color paintings, calligraphy, and so forth. A licensing company, ArtKey, was responsible for obtaining the commercial authorization of the digital contents from Hong-Gah Museum. Meanwhile, three manufacturers (PMI, IF, and KYMCO) were responsible for producing merchandise such as art doors or leather products (Hsieh and Hsu, 2006, pp. 77-88).
- 4) **Digital Botanical Garden Development and Value-Added Applications (<http://www.ntua.edu.tw/~gca/nsc/botanical.html>):** The main purposes of

this project were to demonstrate how this national project utilized the digital content of the Taiwan Forestry Research Institute (TFRI) to develop commercial applications and education services in a creative fashion. For the commercial applications of the digital content, this project developed a series of stone-painting items for internal decoration in cooperation with an international firm (Artilize). The team also produced “The Language of Plants” for eight types of series pave products, such as plum, orchid, bamboo, chrysanthemum, lotus, peony, narcissus, and plantain. The research team, with industry collaboration, used the digital content authorized by TFRI to develop the color and white series pave, used to decorate our life environment.

Four Approaches to Value-Added Application and Services

The purpose of value-added applications is to maximize the use of digital contents and make Taiwanese arts and culture available through internet and global marketing. According to the known experience of the above studies, the methods of value-added applications and services can be divided into four approaches: Learning and Education, Preservation and Inheritance, Promotion and Activities, and Merchandise and E-commerce (see Figure 2). These four approaches put a link between artists (content creators), museums (content holders), databases creators, cultural industries, and international arts and culture trading platforms. Value-added applications do not only facilitate the upgrade of traditional industries through academy-industry cooperation, but also introduce Taiwanese cultural creative merchandise to the international community, which, in turn, creates a new opportunity for Taiwan’s art and cultural industry.

The approach of “Learning and Education” is to build database functions such as information search, upload-

ing, and downloading for users. The database will contain all the information about the digital content in a fashion of “knowledge and culture learning.”

The “Preservation and Inheritance” approach is to create a platform for culture and arts preservation, sharing, and exchange in a fashion of “knowledge and culture exchange.” A purpose of “Promotion and Activity” is to promote the Taiwanese culture and merchandise developed by the projects by holding cultural activities and events in a fashion of “knowledge and culture promotion.” The approach of “Merchandise and E-commerce” is to construct a platform to promote and sell the merchandise developed by the projects via an on-line display and purchasing system.

The “Academy-Industry” Cooperation Mechanism

Merchandise was developed and marketed based on this “academy-industry” cooperation mechanism (see Figure 3). The following paragraphs illustrate the “academy-industry” cooperation mechanism and value-added applications and services via the four approaches introduced in Figure 2 using “The Promotion of Traditional Production Industry through Archived Artworks” project as an example (Hsieh, Chien, & Cheng, 2007, pp. 134-142).

Hong-Gah Museum, located in Taipei City, is a private art museum established by Chew’s Culture Foundation in 1991. Since its establishment, it has devoted itself to preparing a satisfactory storage for storing artworks, providing a space for artists to display their works, and promoting art and cultural activities in the Taipei community. In other words, it considers itself a museum for the community and tries to reach more people through various exhibitions, lectures, and other cultural community activities.

Despite its limited exhibition space, the Hong-Gah Museum owns an impressive collection that can be

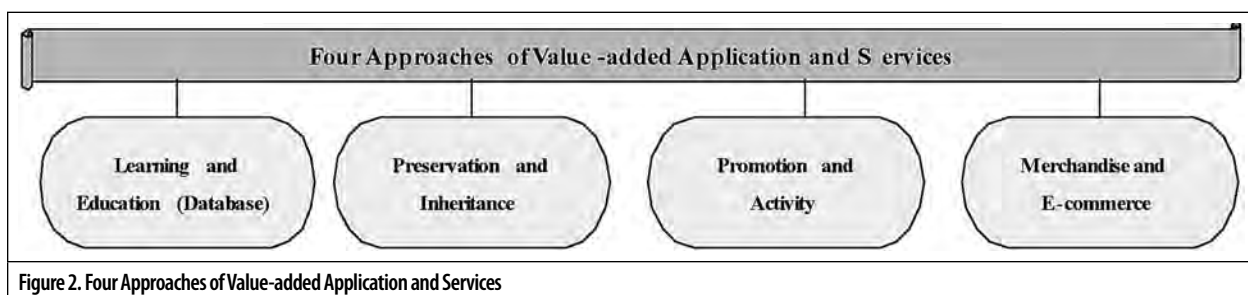


Figure 2. Four Approaches of Value-added Application and Services

divided into four groups: 1) western style artworks, such as oil paintings, watercolors, drawings, sculptures, and mixed-media works; 2) oriental style artworks, such as ink paintings, calligraphies, and glue paintings; 3) Chinese embroidery; and 4) documentary drawings, which include Taiwanese drawings and paintings done before the end of World War II that were often left out from the art history of Taiwan. These artworks were mostly done by artists from twentieth-century Taiwan. In 2004, a number of selected artworks went through the process of digitization with the assistance of the Council of Cultural Affairs (CCA) of Taiwan. More than a thousand of these digitized artworks have been licensed for business commercial applications (see Table 1) and the digitization and the licensing of the museum collection is an on-going process. In addition to the collection from Hong-Gah Museum, eight artworks from the Hi De-jin Foundation were also licensed for commercial applications to the project “The Promotion of Traditional Production Industry through Archived Artworks.” This project tried to create new values for these artworks through value-added applications and services with the cooperation of industry.

Based on the academy-industry collaboration model shown in Figure 3, the purposes of this project were two-

fold: 1) to utilize the digitized contents from a private art museum, (Hong-Gah Museum), to develop value-added applications and services, and 2) to establish new applica-

Media Category	Numbers Amount of Collection	Numbers of Licensed Artworks
Oil Painting	444	229
Watercolor	57	40
Drawing	38	21
Mixed-Media	60	16
Ink Painting	753	406
Calligraphy	472	200
Embroidery	396	231
Block Print	66	22
Acrylics	9	1
Sculpture	61	20
Crystal	25	0
Photography	61	0
Crafts	14	0
Total	2,456	1,186

Table 1: Amount of Hong-Gah Museum's Collection Licensed for Commercial Applications in 2006

Note: These data were provided by Hong-Gah Museum

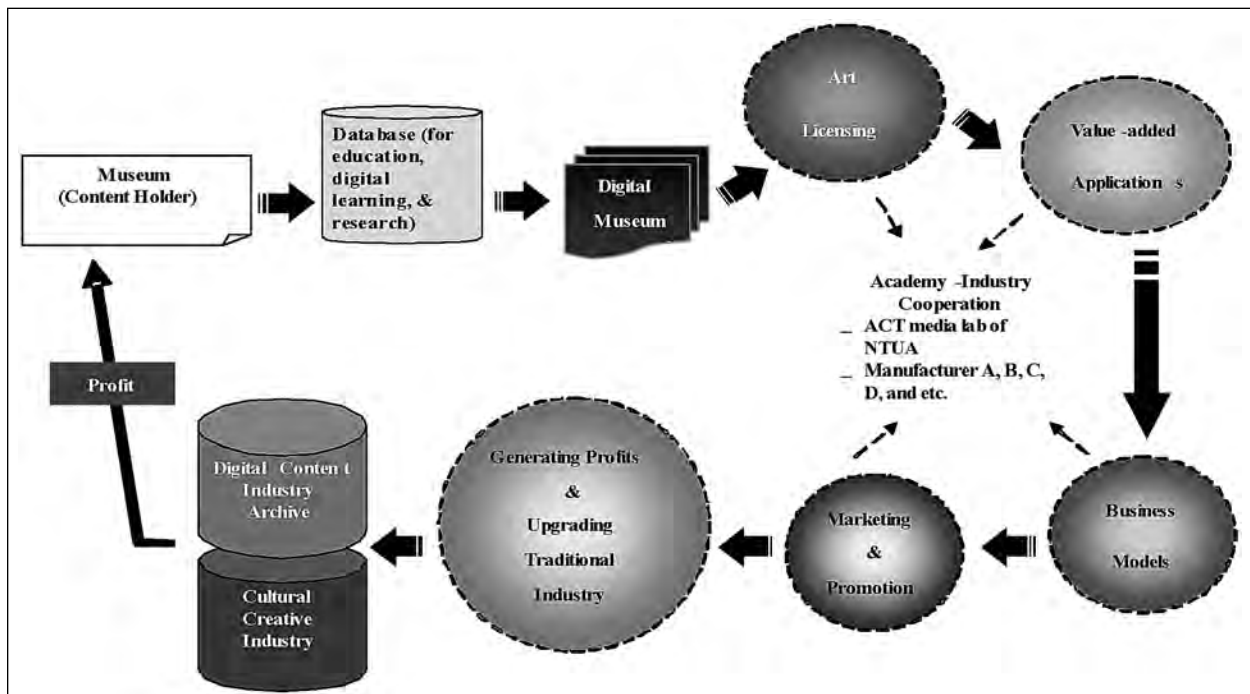


Figure 3. The Academy-Industry Cooperation Mechanism

tions and business models by collaborating with three major traditional manufacturers in Taiwan (Photo Man Image (PMI) Corp., IF Pacific Corp. and KYMCO Riders Corp.) to develop merchandise such as art doors and female hand bags.

The value-added applications and services of the project were divided into four major areas: Learning and Education, Culture Preservation and Inheritance, Promotion and Activities, and Merchandise and E-commerce. The research team, ACT (Arts, Creativity, Technology) Media LAB in the Department of Graphic Communication Arts at National Taiwan University of

Arts (NTUA), was responsible for planning, implementing, and monitoring the whole process. Hong-Gah Museum, as the content holder, provided their valuable digital contents such as oil paintings, water color painting, calligraphy, and other items as the elements for the value-added applications and services. A licensing company, ArtKey, was responsible for obtaining the commercial authorization of the digital contents from Hong-Gah Museum. Meanwhile, Photo Man Image (PMI, a digital image printing company), IF Pacific Corp. (a leather company), and KYMCO Riders Corp took part in this one-year project and were responsible for producing merchandise designed by the project team. Finally, all participants worked together to develop the marketing strategies and determine the distribution channels for merchandises. Table 2 shows the responsibilities of each participant and Figures 4 exhibits the whole process of value-added applications and services developed by the projects. Through this process, artwork could be exposed to the public not only through museum exhibitions, but also through the global marketing of the merchandise derived from the digital images of the artworks.

Participants	Responsibilities
Content Holders (Museums):	<ul style="list-style-type: none"> • Providing digital images and the information of the artworks • Communication with artists
Licensing Agent (ArtKey)	<ul style="list-style-type: none"> • Obtaining commercial licensing of digital images of artworks
Academy (ACT media lab from NTUA)	<ul style="list-style-type: none"> • Designing merchandise • Brochures and catalogues designing • Conducting marketing research and strategy, • Planning and hold promotion activities, • Designing the project website containing a database and e-commerce platform • Handling overall integration of the participants' resources
Industry (Manufacturers): PMI, IF, KYMCO	<ul style="list-style-type: none"> • Merchandises sampling • Merchandises modeling • Merchandises producing • Marketing and distribution

Table 2. Participants and their Responsibilities

Results of the Study

This project was divided into four major groups of value-added applications: Learning and Education, Culture Preservation and Inheritance, Promotion via Activities, and E-commerce and Business Models. As exhibited in Figure 5 and Figure 6, a website of this project (<http://www.ntua.edu.tw/~gca/nsc/honggah.html>) was constructed to make Taiwanese arts and culture more accessible to the general public and to serve as a platform for e-commerce to sell online the merchandise developed by this project.

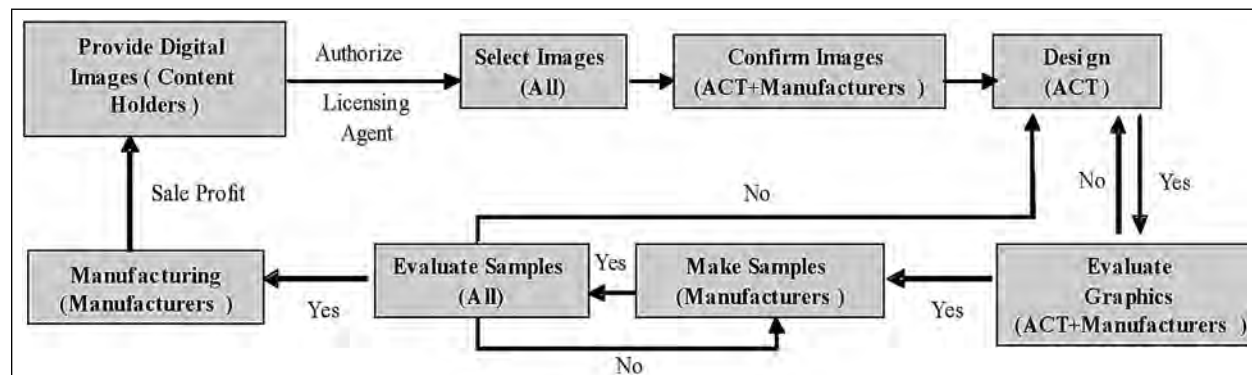


Figure 4. The Value-added Applications and Services Process

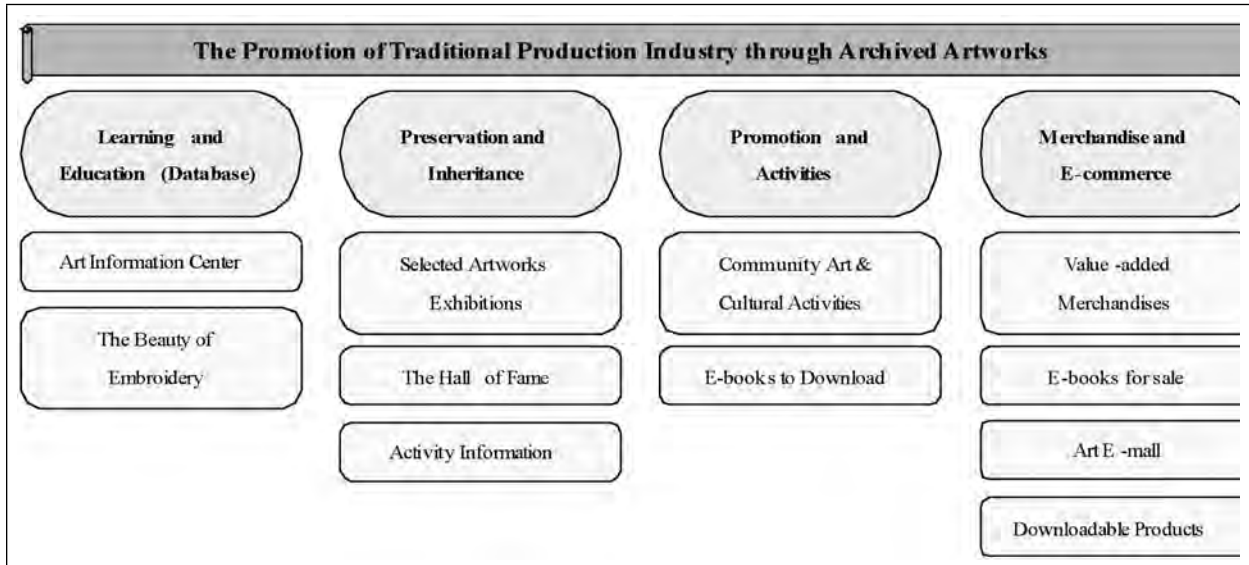


Figure 5. The Structure of the Project Website

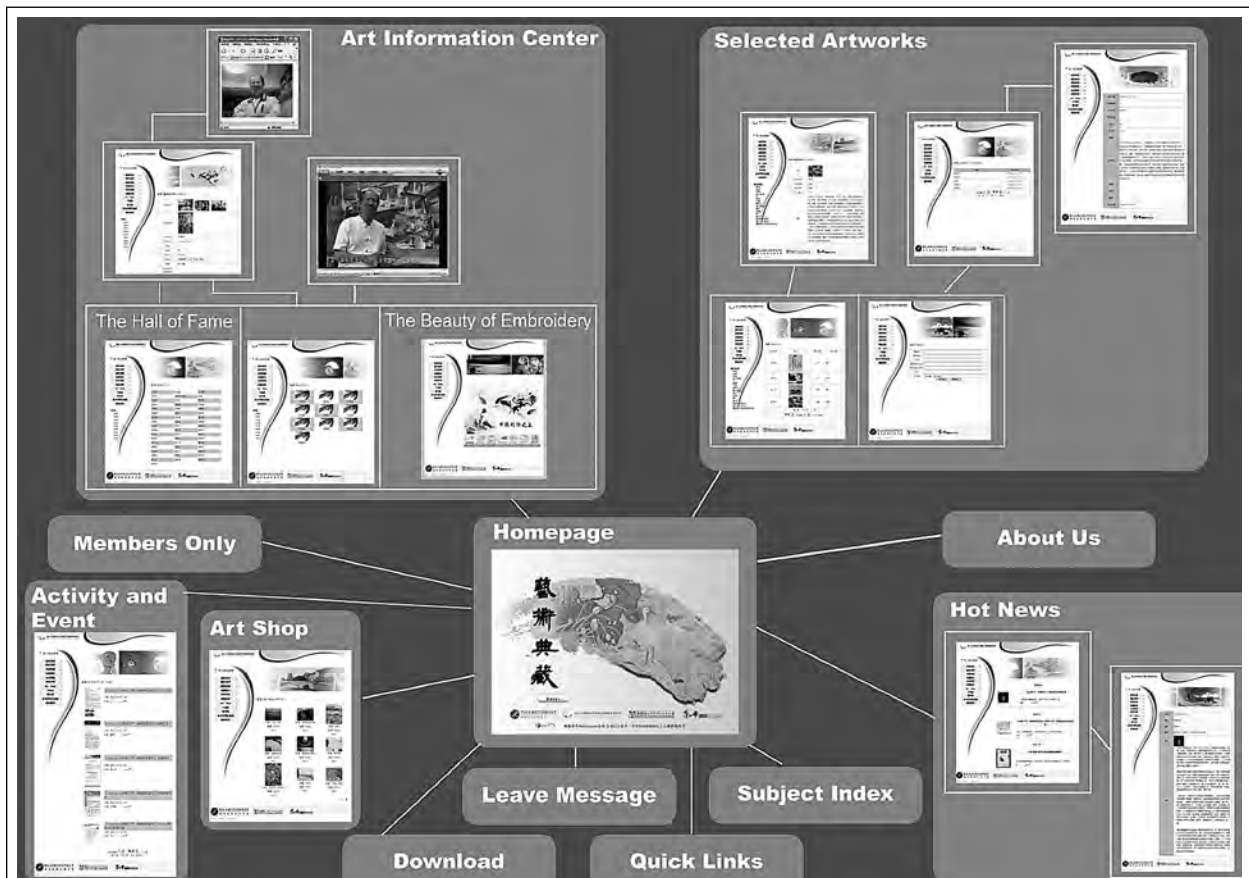


Figure 6. The Digital Arts Information Database of the Project

Learning and Education

The Learning and Education value-added application section, as shown in Figure 7, based on the purpose of permanent culture heritage preservation, is a digital art information database. More than two thousand digitized artworks from Hong-Gah Museum were categorized according to the type of media used for creation by the artists, including oil painting, watercolor, drawings, block print, sculpture, acrylics, mixed-media, ink painting, and calligraphy. Each artwork is shown with its metadata such as its title, artist name, size, media, and year of creation. A search function allows users to search for what they need to know about the artworks and artists. Moreover, since embroidery is a major part of Hong-Gah Museum's collection, it is especially introduced in the section of "the Beauty of Embroidery." In addition, an e-book of the same content was developed for sale.

Preservation and Inheritance

The Preservation and Inheritance value-added application section was constructed based on a digital art park concept that was divided into "Selected Artworks," "the Hall of Fame," and "Activity Information" (see Figure 7). In "Selected Artworks," 115 artworks, created using different media, were selected from the collection for detailed introduction. Each artwork is introduced by a

500-word abstract written by the art critic Juey-Jen Shih. "The Hall of Fame" was especially constructed to depict twentieth-century Taiwanese artists. Information about the artists was displayed, and 20 representative artists were selected for in-depth interviews. The interview videos are also shown in this section. Furthermore, "Activity Information" is a sub-section providing information about arts and cultural activities of the museum and the project.

Promotion and Activities

The third value-added application, "Promotion and Activities," aimed to display arts and cultural activities that go along with the exhibitions for the community. The goal is to attract more people to visit the museum. It was also expected that the activities would be an effective approach to promote the latest merchandise developed by the project. Furthermore, several events and activities were held during the first quarter of 2007. All of the promotion activities were recorded and the related news reports for these activities and events were presented in this section. In addition, the merchandise developed by the project was exhibited in the 18th Taipei International Building, Construction, and Decoration Exposition from December 29, 2006 to January 1, 2007. Art doors and ceramic tiles, two series of arts products, were designed and developed by the ACT team and manufactured by PMI in 2006. These two product lines

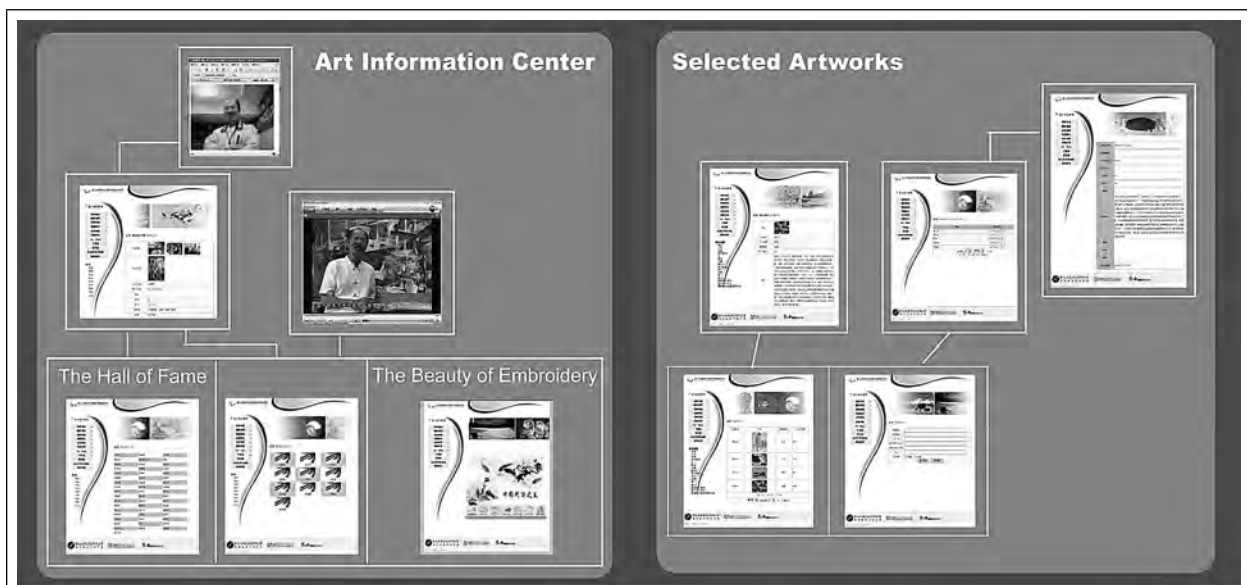


Figure 7. "Learning and Education" and "Preservation and Inheritance" Structure

PMI-Ceramic Tile



Figure 8. Sample Arts Products by PMI (Ceramic Tiles)

have moved the traditional building and decoration business to a new era, and the new business model is expected to enrich peoples' lives by integrating Taiwanese cultural heritage and new technology.

In addition, this project team participated in the Digital Archive Commercial Application Competition held on December 1, 2006. Six art pieces, including ceramic tiles, doors, lamps, and purses, were shown. The main purpose of the competition, held by the Digital Archives e-Park from National Science Council, was to encourage people to creatively design commercial products using digital content authorized by museums or other content holders. All of the six products developed by this project were not only selected to enter the final list, but were also awarded remarkable prizes. The art door titled "Mapping Art Door" even won the first prize of the competition.

A promotion activity named "Playing with Digital Arts," held on December 9 and 10, 2006 by the Department of Graphic Communication Arts at National Taiwan University of Arts and Hong-Gah Museum, solicited several famous artists to discuss issues of how to maximize the use of digital arts. Those artists used abundant creativity to design four series of creative T-shirts during the event to promote the spirit and concept of applying digital arts to peoples' lives.

As mentioned above in the "Promotion and Activities" section, a new cooperation and business model, from artwork licensing to merchandise marketing and promotion, was fully presented in this section. Through a series of promotional activities, this project not only attracted more people to appreciate the beauty of digital artwork, but also promoted the new business model of university-industry cooperation, and, of course, the merchandise developed by this project.

Merchandise of E-Commerce

The main emphasis of the study is the Value-Added Application of Merchandise and E-commerce section; it intended to promote Taiwanese arts and culture through the marketing of art merchandise. The merchandise produced by this project includes: architectural materials, leather accessories, e-books, and downloadable products, such as e-cards, e-wallpapers, and screen savers. The business model of incorporating the ACT Media Lab of NTUA (the academic sector) and PMI, IF, KYMCO (the industry sector), was considered successful at the end of the project. PMI, one of the largest digital printing companies in Taiwan that manufactures architectural materials by OEM for other businesses, does not have its own design team and brand name. PMI has tried very hard to transform itself into a company having its product lines and own brand name. After participating in this project,

PMI realizes that creativity and designing arts are the key to the success of building new product lines and its own brand name. Now, the company has its own design team and know-how to run the product line of art doors and interior decoration products.

In this project, Hong-Gah Museum and ArtKey provided the licensed images, and both undergraduate and graduate students in the Department of Graphic Communication Arts and the Department of Crafts and Design at NTUA designed the products and their catalog using those licensed images. PMI undertook the merchandise production of ceramic tiles, art doors, and art gifts. Since the target consumers of these items are people with high income, most prices were set high. According to PMI, each ceramic tile was limited to only 500 units and the set price somewhere between \$160–175 US. As to the distribution channels and marketing, PMI has already planned to promote its art products by selecting specific Channels such as building material stores, furniture agents, and others. Some of the PMI sample arts products are shown in Figure 8.

Another company that participated in this project was IF, a famous Taiwanese leather product company. In this project, Hong-Gah Museum and ArtKey also provided the licensed images of an artwork named “Palm-leaf flower,” by Wu-Haq and several embroideries. The final products developed based upon those authorized digital images were female purses (see Figure 9). The purses were co-designed by the IF company and ACT media lab at NTUA. IF carried out the production of the purses. Two series of purses were designed and manufactured by this project. Due to the market strategy, the production was limited to 300 pieces only for each series when they were first released in February, 2007. The target consumers are

high-income career women. The two series of purses have been sold in department stores nation-wide in Taiwan and will soon be sold overseas. It is also estimated that the output value of purses will be approximately \$10,000 US for the first year in the market.

The third art product of this project was designed by the ACT team and manufactured by KYMCO, the largest rider manufacturing company in Taiwan (see Figure 10). The image was also licensed from Hong-Gah Museum via the agency ArtKey Company. Art faceplates for beach buggies were developed using the licensed image. According to KYMCO, it will produce 50,000 pieces for

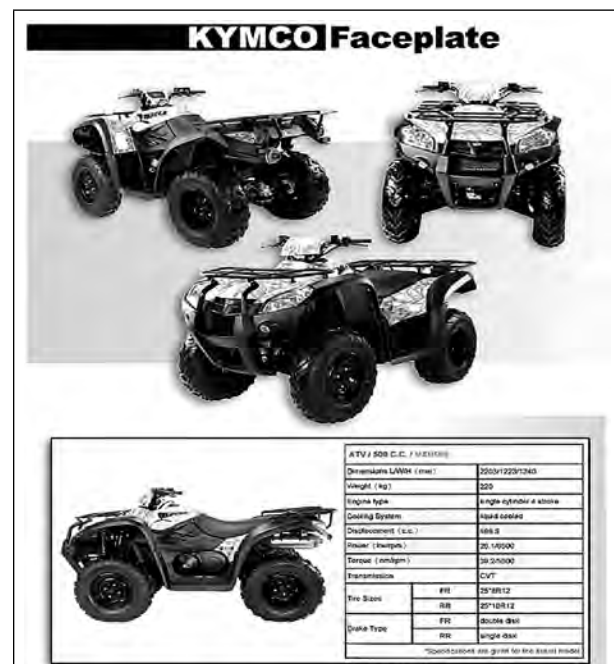


Figure 10. Arts Faceplate form KYMCO



Figure 9. Sample Arts Products by IF (Female Purses)

export to Europe during the next two years and generate approximately \$76,000 US.

Conclusions and Recommendations

All merchandise mentioned above are introduced and sold at the project website (<http://www.ntua.edu.tw/~gca/nsc/honggah.html>). The e-Market section of the website provides users an opportunity to obtain specific information about the products and the original artwork that inspired the designers. Of course, it also allows people to purchase project art merchandise on line. Furthermore, the e-Market section provides an online chatting area for users to share information and exchange ideas.

The main purpose of the value-added applications in the project was not only to create new business opportunities, but also to enhance the value of digitized artwork and upgrade traditional manufacturers through the process of artwork licensing and manufacturing. With the support of NSC, the Department of Graphic Communication Arts at the National Taiwan University of Arts, Hong-Gah Museum, ArtKey, Photo Man Image (PMI), IF Pacific Corp., and KYMCO, collaborated on the one-year project: "The Promotion of Traditional Production Industry through Archived Artworks." The project had three emphases:

1. Making arts and culture a part of life, and making life a part of arts: producing delicate art products using authorized digital content;
2. Establishing an art licensing system: with the help of a licensing agent to integrate different industries to build up an effective collaboration system; and
3. Establishing marketing and global branding: promoting the fine Taiwanese culture and arts via international marketing.

By digitization, artworks have more opportunities to be exposed to the public; meanwhile, the traditional manufacturing industry has more chances to produce high economic value products. How to maximize the use of those digitized contents and create more output value, then, becomes an important issue for the cultural creative industry and the traditional manufacturing industry. In this example project, the collaboration among NTUA, Hong-Gah Museum, ArtKey, PMI, IF, and KYMCO introduced a successful model of facilitating the dissemi-

nation of valuable digital contents. It is a model that requires the cooperation and effort of every participant. So the creativity and profits generated from the merchandise are shared with each participant. Through mutual cooperation, value-added applications, and branding establishment, the model is expected to bring a respectable amount of profit to every participant so that all the participants have more resources to create, design, and produce better products. This is what this article calls "a never-ending cycle." The more profit the model makes, the more funding resources will be available for further digitization, value-added applications, product development, and merchandise marketing and promotion.

The model of this academic-industry cooperation is expected to bring benefits to each participant. However, some constraints and barriers inhibit the success of the model, especially problems regarding the licensing system and government regulations. These barriers are summarized below:

1. Owning the object but not the copyright (for museums);
2. No authority regulating digital archive licensing;
3. Lack of a content protection system for digital archives;
4. Low licensing motivation for government content holders and organizations;
5. Lack of regulated profit feedback system for digital archive licensing;
6. No pricing rules for digital archive licensing; and
7. Lack of content transaction platforms.

According to past experience, there are some recommendations to be made. First, museums and artists must be more willing to release the copyright of their digital content. According to the experience of the research team, some museums are unwilling to spend time and effort to partake in this kind of academy-industry cooperation project because they are reluctant to get involved with the licensing and commercial issues.

Second, the expectation of the industrial sector is not always consistent with that of the academic sector. The industrial sector looks at the model from a totally business

point of view, instead of from a cultural perspective. Therefore, the selection of digital images and the opinions about the products by industrial participants is very likely to be different from those of the academic sector. If the expectations of both sides do not match, cooperation might decrease and there might be disagreements. The model of this academy-industry cooperation, as this article presents, is rather new in Taiwan. There must be some kind of incentive for companies to join in this type of project. For example, they may be able to establish their own brand.

Third, the profit sharing issue seems to be the most difficult one to deal with for all participants. The profit brought by the model should be shared with the content providers, the art licensing company, the academic sector, and the industrial sector. If the profit sharing percentage is not settled, there might be problems in the future. Due to the lack of a well-established profit sharing mechanism in Taiwan, it took a lot of discussions to get a satisfactory result in this project. This article therefore suggests that a practical mechanism for profit sharing be established as soon as possible.

Finally, the purpose of this type of project is not only for culture heritage preservation, but also for enhancing the traditional manufacturing industry and peoples' lives. The model of academy-industry cooperation on facilitating digital archives is worth developing. Although there is still room for improvement, with effort from various participants, the model could become more and more mature. If museums make the best use of an academy-industry cooperation model, there would be more opportunities for their collections to be known to the public. The more people get familiar with their collections, the less distance there would be between the museums and the public. The model, therefore, is strongly recommended to museums.

References

- Canadian Heritage Information Network (CHIN), Retrieved November 5, 2005. From: <http://www.chin.gc.ca>
- Hsieh, Yung-Cheng, Chien, Ju-Chun, and Cheng, Hui-Wen. Utilizing Digital Contents to Enhance Traditional Manufacturing Industry and People's Life. *IS&T (The Society for Imaging Science and Technology) Archiving* 2007, May 21-24, 2007, Arlington, Virginia, USA. Paper published in the conference proceedings, pp. 134-142.
- Hsieh, Yung-Cheng, Sheng-Chieh Hsu. New Opportunities for Traditional Arts—A Case of Hong-gah Museum. *2006 INTERCOM Conference Offprint*. November 2-4, 2006, Taipei, Taiwan. Paper published in the conference proceedings, pp. 77-88, thesis collection 3.
- Hsieh, Yung-Cheng, Wu, Yu-Ju, & Lee, Peisan. A Case Study of Digital Archive and Value-added Application: The Plant Dyeing, Weaving, and Knitting Arts Digital Learning and Value-added Center. *IS&T (The Society for Imaging Science and Technology) Archiving* 2006, May 23-26, 2006, Ottawa, Canada. Paper published in the conference proceedings, pp. 117-120.
- National Digital Archives Program, *Introduction of Applications and Services Division*. Retrieved April 18, 2007, from <http://aps.csie.ntu.edu.tw/eng/intro.html>
- National Science Council. *Strategic Plans, National Digital Archives Program—Introduction of Applications and Service Division*. Retrieved April 18, 2006, from http://aps.csie.ntu.edu.tw/eng/strategic_plans.html
- The British Museum Retrieved November 10, 2005. From: <http://www.thebritishmuseum.ac.uk>
- Virtual Museum of Canada (VMC), Retrieved November 10, 2005. From: <http://www.virtualmuseum.ca>
- The Metropolitan Museum of Arts, Retrieved November 11, 2005. From: <http://www.metmuseum.org>
- The Hakone Open-Air Museum, Retrieved November 12, 2005. From: <http://www.hakone-oam.or.jp>
- San Francisco Museum of Modern Arts, Retrieved November 13, 2005. From: <http://www.sfmoma.org>
- The Museum of Modern Arts (MOMA), Retrieved November 14, 2005. From: <http://www.moma.org>
- The Louvre, Retrieved November 17, 2005. From: http://www.louvre.fr/llv/commun/home_flash.jsp
- Miho Museum Retrieved November 16, 2005. From: <http://www.miho.or.jp>

This is a juried article

Appendix II. The Media Report about the Project Activities and Events



Philosophical Premises Underlying Successful Education and Training in the Graphic Arts

by Harvey Robert Levenson, Ph. D., California Polytechnic State University

The Accrediting Council for Collegiate Graphic Communications (ACCGC) exists to enhance the quality of undergraduate baccalaureate graphic communications programs in North America and the preparedness of graduates to enter the graphic communications profession. The profession includes all facets of traditional and digital printing, publishing, packaging computer graphics, Web site preparation, Internet publishing, non-print digital printing, and all related segments of the profession. This includes prepress and pre-media, multimedia, press and imaging, post press, specialty process, and management. Management includes marketing, sales, customer service, costing, pricing, estimating, financial controls, production, inventory control, distribution, personnel relations, quality control, and related areas.

Basically, the graphic communications industry is in a state of transition with companies diversifying in mission and processes to address the vast competition of competing communication media—print, the Internet and World Wide Web, television (broadcast and cable), movies, video games, radio, cell phones, PDAs, and more. The industry expects its future leadership to possess the basic knowledge and insights to run its companies effectively, intelligently, and profitably. It is the goal of the ACCGC to make sure that its accredited graphic communications college and university programs have curricula, faculty, support services, and facilities to educate the industry's future leadership. If graphic communications programs of North America's colleges and universities do not possess these capabilities but desire accreditation, the ACCGC provides recommendations to elevate these programs to a status deserving of accreditation.

The well-prepared graphic communications professional of the future needs to be prepared with the leadership skills required of this dynamic industry, and the ACCGC is positioned to help make this occur through its fourteen standards that must be met for accreditation.

The following are philosophical premises underlying successful education and training in the graphic arts. Please read it carefully. With accreditation becoming increasingly important for validating academic programs, it is a guiding document meant to shed light on the broad

reasoning behind the standards that ACCGC accredited graphic communications programs are expected to comply with.

Philosophical Premises Underlying Successful Education and Training in the Graphic Arts

Central to effective graphic communications education are a number of premises that apply equally to education and training in the graphic arts industry of the twenty-first century. They are:

Education does not take place in a block of time.

Whatever it takes at the university; four, five, six years or even more could represent the boundaries within which a block of education takes place. The time involved depends heavily on the individual being educated, the education or skills being developed, and the complexity of the subject matter under investigation. The four-year metaphor for a Bachelor's degree, for example, has fallen and continuing education of individuals already in industry is just that, "continuous." If a career is to remain viable, vital, and productive, ongoing education, training and re-training has to be defined and expected for nearly every position in the graphic arts on the management and production levels. Today's students in undergraduate baccalaureate programs must be made to understand this.

The university is the last bastion of idealism.

It is the laboratory and its ability to create situations simulating industry that provides students with a window on their professional futures. That future includes the expectation that they will propose and simulate ways to improve the industry by drawing on their university experiences. It is through tests and trial and error that students develop a practical understanding of what works and what does not work in achieving desired outcomes. A university providing the opportunity for students to experience ideal conditions, or conditions that are as close to ideal as possible, graduates people who bring some of that idealism to industry when they graduate and, hence,

improve industry. They bring new ways of solving problems, and with each generation entering the field, the industry benefits from continuing improvement. Graphic communications laboratories should be designed to provide students with opportunities to experience some of the same idealism in a practical setting that is part of the best-run companies in the profession.

Education is more than a Bachelor's degree that prepares one for an occupation.

Reading, writing, speaking, and overall communication skills are as important as technical skills in the graphic arts industry of the twenty-first century. Education and training in the graphic arts must address these issues on all levels. "Human" skills are increasingly what drive companies to success. More specifically, marketing, sales, customer service, and related training are as important, or even more important, than training to operate a piece of equipment. Equipment increasingly requires less human intervention and is run by microprocessors and other electronic devices. Hence, training in industry is moving more to preparing people to develop those business skills needed to generate business and to keep equipment running. This must be focused on in graphic communications academic programs.

Education is a service that must address the needs of undergraduates and industry professionals.

Viable academic graphic communications programs should be structured to address the needs of regular students and also industry professionals who require continuing education and training. Labs should be equipped with the type of technology used by industry, thus providing opportunities to simulate real business and production conditions.

A viable educational program, such as a successful business, must have a well thought-out and flexible strategic plan.

All viable graphic communications programs should have a strategic plan addressing forecasts for curriculum reform, laboratory development, faculty and staff development, and related topics. Projecting six years ahead is not unrealistic and such thinking should be the basis for educating students and training industry professionals on what they will need to know in the future. The six years

comes from the opportunity to reform curriculum every two years and then assuming that at least some students will graduate in four years, though some take longer.

New Skill Sets for the Graphic Arts Industry

So, in projecting six years ahead, what do we really prepare students with and what do we really train industry professionals for? From the philosophical premises previously noted come two categories of training needed to develop skill sets for employees of the graphic arts in the twenty-first century. They are mental or cognitive skills and physical skills.

Mental or Cognitive Skills

Accepting change as a rule.

Traditionally, change was the exception in the graphic arts. However, it is now the rule. For example, it was about 430 years between the time Gutenberg invented the process of duplicating movable type and the invention of the linotype machine. It was another 56 years between the invention of the linotype and the practical application of phototypesetting. Hence, little happened to further the process of placing words on paper between these lengthy periods. Expecting to enter, continue, and complete a career today doing the same thing (as was possible for linotype operators and then strippers) is unrealistic. Today, technological change can occur daily and be unanticipated. The expectation of change must be addressed in education and training, and employees must adopt the notion that if they expect the unexpected, there will be no surprises. Expecting change requires a mindset that must often be developed. Resisting change is a natural tendency. But doing so inhibits professional growth in technologically dynamic field such as the graphic arts.

Analytical thinking and understanding systems.

Systems concepts, file management, and workflow analysis has become the skill set required for aspiring managers in the graphic arts. For example, systems concepts involves standardizing and quantifying operations whenever possible to help insure consistent results, regardless if one person is working on a particular assign-

ment or if 100 people are working on it. Being able to measure quality and measure results is all part of the outcome of systems concepts. This differs from the craft orientation of the graphic arts in past decades where each individual in the production flow used her or his own personal skill abilities in producing a job. This is what led to great variability in quality, time taken to complete a task, and other variations that are just not acceptable by today's standards and customer demands. Analytical thinking requires training as does understanding systems. Both are vital components of education in graphic arts academic programs and training in the modern graphic arts industry.

Understanding the relationship between people and technology.

It seems that there is a certain mystique or special esoteric skill development necessary before one can run application software to achieve computer results or to assess problems on computers. This was not so with traditional equipment. For example, nearly any person with any level of training can get into a car and drive it from point A to point B. In past years, before the introduction of microprocessors to printing presses, nearly any press operator with some basic training could turn on a printing press and get it to work. However, today there are some extremely bright and highly educated people who do not know how to navigate application software or figure out the basic procedural manipulations necessary to achieve certain computer results with such software. This is in spite of the fact that they have tried. More specifically, for example, preflighting has become a significantly important part of a digital workflow. However, learning preflighting software takes a particular type of person having the mindset to focus intensely on the various navigational procedures involved. While nearly any person can walk into any car and make it do what it is supposed to, not any person can get on a computer and operate it efficiently or even know how to operate it. Until such a time that running a computer application is as simple as driving a car, there will be a substantial amount of education and training necessary for students in graphic communications programs and operators in the graphic arts to use computers efficiently and profitably.

The range of time and training required in developing an understanding of computers and application software varies tremendously from individual to individual. In the

graphic arts, knowing how to select people with the mindset attuned to operating computers efficiently, to understanding navigational procedures to achieving desired results, and to solving problems efficiently is critical. It seems in the electronic arena, it is the ongoing "communication" between people and technology that helps to determine when a person has internalized procedural requirements and when a system is ready to cooperate in performing desired functions. This is vital understanding that must be built into academic graphic arts programs.

Understanding contingency management.

Contingency management is the fourth of the management style evolution that has evolved from the days of authoritarian management of the early part of the twentieth century. It was then when effective management was thought to be achieved through one-way communication where those in authority dictated terms, and employees simply followed them. Authoritarian management gave way to human relations management in the post WWII 1940s that really took root in the 1960s. Studies of that era showed that operational efficiency was improved when employees were permitted to participate in decisions related to how they did their jobs. This was followed by the socio-technical management style of the 1970s and early 1980s. This was the era in which the impact that computers and other electronic devices would have on the workplace became clear. This management style suggested that in effectively run companies, management would have to delegate responsibility and authority to electronically savvy employees who knew more about technology and production than did their supervisors—a first in the history of the graphic arts. This gave way to contingency management of today.

Contingency management means that there is no one management style best suited for running a company all of the time. For a company to exist, survive, and grow, the applied management style must vary with changing times and particularly as they relate to changing economic conditions. In other words, when times are good and cash flow is plentiful, one style of management works best. Typically this is a time where there is great latitude in providing professional development opportunities for employees, on-the-job latitude for trials and experiments, flexible working hours, and a general loose and open air of management. On the other hand, during difficult eco-

conomic times, as is facing some of companies of the graphic arts industry today, management styles must be tightened and become more rigorous. With diminishing cash flow comes diminishing freedoms on the job and fewer professional development opportunities, and employees must be trained to expect this. They may not be permitted to attend seminars and conferences that they were permitted to attend in better times, and they may not have as much say in their working hours and conditions as they used to. That this becomes an expectation of the job, and not a disappointment of the job, necessitates education and training that is quite different from technical training. Such education must be reflected in our graphic communications academic programs.

Creative cognitive skills as opposed to physical craft skills.

Physical mechanical skills are easily taught, but are becoming a diminishing requirement in the graphic arts. Presses virtually run themselves and imaging takes place from computer monitors directly to the printing plate or to the printing press cylinder. These are merely a couple of examples of where physical human skills have been replaced by technology. Imaging film and film processes are no longer an important part of the printing process whereas in the past they were the nucleus or core of the process. At a printing plant producing a major national daily newspaper in full-color, press operators were observed sitting beside the press reading books while the press was running at over 30,000 impressions per hour. Basically, the press was being driven and controlled by microprocessors. Whereas in the past, the press operators, and many more than are required for presses controlled by computers, would be all over the press while it was running to control ink feed, fountain solution, ink-water balance, register, density, and so on. Such physical skills have been replaced with the need for cognitive skills including workflow analysis, file management, preventive quality control, statistical process control, total quality management, and so on. Being able to analyze and anticipate the most efficient, productive, and profitable workflow from the time a job comes in the front door of a company to the time it is delivered to the customer has become the fundamental skill set needed by employees in an effectively run graphic arts company. This includes the “micro workflow” that takes place in each department of the company involved in producing a job. An understanding of these transitions are needed in academic

graphic arts programs in preparing students to understand the field that they are entering.

Organizational communication skills.

Prospective employers of graphic communications students invariably point to communication skills as the most important attribute of entry level employees right out of college. This involves reading, writing, and speaking skills, and also being sensitive to what is effective and appropriate upward, downward, and lateral communication skill. This applies to employees communicating to those above them, supervisors or management staff communicating to those below them in the organizational chain of command, and to people on the same level communicating to each other. However, communication audits of companies often reveals that this is where the major breakdowns occur leading to costly problems such as downtime, waste, misinterpreted instructions, and even animosity among employees that leads to insufficient communication required to get the job done properly. Organizational communication training is becoming increasingly essential in the graphic arts as technology dictates that no one person can complete a job by her or himself and that teamwork is a required component of organizational efficiency. Effective and focused communication is the main ingredient for effective teamwork and is only learned through education and training.

Marketing, sales, and customer service skills.

Again, technology has driven the need to enhance marketing, sales, and customer service skills. The graphic arts industry has been transformed to one in which labor intensity has moved front the “backend” to the “front end” of operations as a result of technology. For example, prior to the introduction of microprocessors and other electronic devices to printing presses, it took four to six people to run a four-color printing press of 38 inches or larger. There would be one person loading and watching the feeder of the press, one person between each of the printing units controlling ink keys, ink-water balance, and performing other tasks, and one person, usually the lead press operator, monitoring the delivery of the press and inspecting printed sheets for register, density consistency, color match to a proof, and so on. Today, the same press with built-in electronic controls can be run by one person, though two are typically used for safety purposes. Not only do the newer presses require fewer operators but

they also produce at three times or more the speed of the non-computerized traditional presses. What this does is create an over capacity that must be sold or else the press begins losing money for a company. Hence, when more is being produced with fewer people in the “backend” there must be more people educated and trained in the “front end” to market and sell this over capacity. Therefore, in the graphic arts company of the twenty-first century, there is the need for more trained marketing staff, sales people, estimators, and customer service representatives than ever in the history of the graphic arts. On the other hand, there is the need for fewer machine operators than ever before and this trend is expected to continue. Graphic communications academic programs must focus on the more service-oriented facets of the industry.

Skills in practicing professional ethics.

Ethics in the graphic arts has recently taken on an entirely new meaning and the issue will be in the forefront of defining business dealings for printers, publishers, customers, and vendors in the twenty-first century. This issue must now be part of education and training directed to graphic communications students as well as to employees at all levels of graphic arts companies.

Graphic communications industry ethics traditionally focused on matters of keeping promises to customers on deadlines, deliveries, and providing fair pricing. In other words, the matter of ethics had to do primarily with relationships between the service providers, such as the printers, and their customers. Today, however, printing has evolved from a provincial industry of thousands of small companies unlinked by any universal codes or standards of behavior. It has become a highly sophisticated and modern industry. Companies in the industry must now have the management savvy to deal with and define issues not typically associated with the printing industry. Some relate to employee loyalty, placing company interest above personal interests, dealings with competition, a wide range of customer services, democracy and equality in the work place, behavior of management and company executives, harassment, activities that are defined by local, state, and federal laws, and measures to prevent unethical behavior. Others include balancing business priorities with personal and community values, accurate record keeping, abiding by company and industry standards, trust and shared responsibilities, relationships with vendors, the work environment as it relates to

health and safety, the highly visible issues associated with handling intellectual property, computers and Internet access, and the entire realm of freedom and access being provided by modern technology.

Unauthorized use of the Internet, photocopiers, company equipment, telephones, company mail including express mail, and taking home copier paper, pens, and related items, varies from company to company. However, such practices are clearly contrary to good ethical behavior but often difficult to track. Some companies take great efforts to track such behaviors, while others do not care if employees telecommute or work odd hours as long as the job gets done and goals are met. Clearly, a uniform standard of ethics for doing business in the graphic arts for the twenty-first century has not been established. Companies set their own rules, guidelines, and codes; some stringently and some loosely. Whatever the company policy is, it is prudent to include it as an essential part of employee orientation and training. The issue of ethics in the workplace should be addressed in graphic communications academic programs.

Understanding laws and policies concerning intellectual property.

One of the most controversial and unresolved areas of new technology has to do with copyrighted material and related intellectual property in print and electronic form. The latest developments in copyright law are a direct response to changing innovative technologies. New technology allows digital conversion of images and text, creation of multimedia, and transmission of data to remote locations. These activities are often central to innovative and effective business dealings and critical to doing business in a highly electronic world. Where more materials are farther from the reach of those who need them, their availability will increasingly be subject to payment of a license fee.

As the graphic arts become more reliant on networking and electronic communication, the mistreatment of intellectual property in most cases can lead to very serious consequences. One major supplier to the industry has been known to terminate an employee on the mere notion of disclosure or abuse of intellectual property. It is becoming increasingly common in the graphic arts for employees to sign an oath of secrecy that is taken very seriously. This has been common in certain printing industry segments for many years, such as in financial

and legal printing, and is now becoming common for all industry segments in which employees have access to intellectual property. Employee knowledge of the legal requirements and company policies regarding the use of intellectual property is an important component of graphic arts training today and should be addressed in graphic communications academic programs.

Overall communication skills.

This requirement cannot be overstated and is worthy of some closing notations under the category of Mental or Cognitive Skills. Again, communication training means training people to “communicate” with technology and “training” technology to “communicate” with people, e.g., making sure that technical components are of the type that people feel comfortable with and are not intimidated by. It also means educating and training people to communicate with people at all levels of the organization and “training” technology to “communicate” with technology, e.g., making sure that the components, connectors, and software needed for machines to “communicate” with machines are of the proper type and are properly configured. Perhaps most important it means training employees at all levels of the organization to communicate properly and effectively with the company’s external constituencies including prospective and current customers, equipment and supply vendors, service personal brought in from the outside to help solve problems and to perform maintenance that cannot be performed internally. Feeling that one is being communicated to with respect, dignity, and sensitivity is the key to achieving goals expeditiously and with expected outcomes. Such communication capabilities are not innate. They often must be taught beginning in academic institutions having programs in graphic communications.

Physical Skills

While the emphasis on training is clearly moving to the mental and cognitive facets of the graphic communications profession, there are still essential physical skills that must be addressed. However, some are quite different from those requiring focus in years past. Here are some.

The ability to minimize waste.

Waste continues to cause major variability in printing profitability. And in spite of attempts to control it and

anticipate it since the days of Gutenberg, it continues to be the main element often making the difference between a profit or loss on a printing job. The key contributor to this situation is paper waste that has become exacerbated in recent years by the rising cost of this most expensive disposable commodity used in printing. Paper accounts for between 30 percent and 50 percent of the cost of printed products. With faster printing presses, paper gets wasted faster (probably three times faster on electronically-controlled presses) than on the previous mechanical presses. Additionally, some of the newer digital presses also encounter extreme waste due to the newness of the technology, and aspects of control is not yet known by users. In spite of predictions of a society using less paper, the trend is in the opposite direction with more paper being used than ever before. More paper used equates to more paper wasted. More paper wasted accounts for less profitability of printing jobs. This is a major problem of business survival in the highly competitive commercial printing industry. Education and training in anticipating, controlling, and preventing waste is key to business success in the graphic arts and should be taught in graphic communications academic programs.

The ability to improve and maintain quality.

Products of the graphic arts industry continue to be viewed as a “necessary evil” for the most part by those purchasing such products. Printing, for example, and now digital non-print images purchased for advertising and marketing purposes, represent expenses that buyers prefer not incurring. However, they have to in order to survive in a very competitive marketplace. When a product is considered a “necessary evil,” those buying it want it at the lowest possible price, as quickly as possible, and at the highest possible quality. This is part of the dilemma that commercial printers have faced for centuries in trying to earn a decent profit. Hence, the question is: What type of education and training is required to instill in employees of the graphic arts the knowledge and skills needed to accomplish this difficult feat of providing low prices, fast delivery, and high quality? The answer is knowing how to negotiate supply purchasing arrangements, in understanding workflow management, in knowing how to monitor production systems, in knowing how to perform quality monitoring and how to control systems, in knowing how to manage inventory, in knowing how to estimate jobs that may be used for multimedia, and in knowing how to put delivery mechanisms in place. The

goal is to learn how to avoid backward movement caused by errors, learning how to assure quality consistency, learning how to meet all customer expectations, and learning how to predict and control waste. Graduates of graphic communications programs having this knowledge are in a position to immediately contribute the corporate success.

The control of electronic devices.

Education and training in the control of electronic devices is essential in nearly every facet of the graphic arts including prepress, press, post press, as well as in the production of non-print media such as Internet publishing, Web authoring, DVD and CD-ROM production, and so on. This differs greatly from the control of mechanical devices with their focus on manual dexterity and manipulations in some cases, and in maintenance (knowing how to fix mechanical items) in others. The control of electronic devices encompasses microprocessor and circuitry analysis; being able to navigate through software applications; knowing how to create PDFs (Portable Document Formats); knowing how to compress files to expedite transmission; knowing how to move files from one application to another; knowing how to manipulate image resolution, contrast, brightness, and size; knowing how to do RGB/CMYK (Red, Green, Blue/Cyan, Magenta, Yellow, Black) conversions; knowing how to cross-platform electronic files; and so on. Education and training in these areas is substantially different from mechanical training and has become a vital component of education in the graphic arts.

Knowledge of computer management and workflow systems.

Training in computer management and workflow systems involves learning about networking and how computers are interconnected with other technology in creating completely digital and seamless workflows. For example, it is not unusual for graphic art companies to have departments with multiple computers, each of which are networked through a central server. This allows computers to “talk” to each other and enables the easy movement of files from one workstation to another. Additionally, it has become common for computers, through servers, to drive prepress, press, and post press equipment such as computer-to-plate systems, digital on-demand and variable imaging printing presses, and even

some finishing technology such as ink jet addressing systems. How these facets of the production workflow are interconnected or networked, from where and to where data flows, and how to capture data within the workflow to make changes and corrections, are vital parts of graphic arts education and training in the twenty-first century.

Knowing how to “repurpose” for multimedia.

“Repurposing” is one of the newest words in the graphic arts vocabulary. It refers to creating or capturing an electronic image and manipulating it so it is suitable for either multimedia or print applications. For example, an electronic image created for distribution over the World Wide Web has different requirements than an electronic image created for reproduction on a web printing press. Copy range (difference between highlight and shadow density), sizing, resolution, and other physical properties of the image must vary for optimal results in both media. Preparing electronic images for “burning” onto a DVD or CD-ROM has yet other requirements, and preparing images for proofing on ink jet or laser printers has yet others. Knowing how to repurpose images for these applications and others requires substantial training in understanding electronic image construction, native formats, differences between ppi (pixels per inch), spi (spots per inch), dpi (dots per inch), and related structural components of electronic images. These aspects of repurposing should be taught in graphic arts academic programs.

The ability to improve job handling practices and productivity.

It seems that as smooth as graphic arts production may appear, there is always room for an upward spiral of improvement. Intelligent graphic arts management today includes ongoing assessments of efficiency including how a job is handled in every cost center or production department of a graphic arts company. Being able to make such an assessment requires an in depth knowledge of job handling requirements and options in each production department. This used to be a fairly simple matter prior to digital workflows and performing production through software applications. One trained in mechanical production routines would easily be able to spot inefficiencies by merely walking through a department and observing manual routines. However, digital technology

and software applications have made invisible those routines that influence production efficiency. It takes a special type of education and training in software and digital workflow analysis to become sensitized to areas in which efficiency can be improved.

Conclusions

The graphic communications profession needs a vision of the future and there is no better group to help form this than those educators preparing the industry's future leadership. A viable vision must reflect its role in supporting the sustenance and growth of the graphic communications profession now and in the future. It needs to address value-added products and services, and business strategies for its companies and its company's present and perspective customers. It needs visibility and it needs to be proactive.

Consider that the graphic communications industry is in a quandary. It is in a state of perplexity or uncertainty over what to do in a difficult situation. For the first time in its history it faces uncertainty in light of new and emerging media, primarily the Internet and online alternatives to print. This situation is not of the industry's own making. The pervasiveness, meaningfulness, and detailed nature of print media had not changed. It is the perceptions of those that use media that has changed—advertisers, marketers, related businesses, and individuals. The simplicity, accessibility, and inexpensiveness of the Internet has lured media users to this new medium without first understanding the extent to which, if any, Internet communication including advertising and marketing is more or even as effective as print has proven to be for centuries.

Our present educators need to instill in their students an understanding of these issues. They must do it in such a way that when their students graduate and enter the profession, they will have a sense of what is needed to keep graphic communications companies viable and successful.

The graphic communications industry will survive and grow only when it:

- Begins seeing itself and acting as a service profession.
- Begins increasing the extent to which on-demand is offered.
- Increases the degree to which digital and variable data printing is provided.
- Adopts and embraces alternative media as additive, i.e., the Internet.
- Provides value-added products and services, i.e., ancillary services.
- Increases its focus on niche markets.
- Becomes more personal and interactive in its product offerings.
- Invests in new technology that supports the market desires for communication media.
- Markets itself better to customers, i.e., print buyers, advertisers, and marketers.

The ability to do and be all of this rests in having personnel with the intellect, open-mindedness, business sense, understanding of technology, and vision to transform the graphic communications profession into one that addresses the fundamental information and communication needs of society—on the personal individual level and for commerce. The philosophical premises presented in this paper for education and training is meant to help achieve this.

This is a juried article.

Manuscript Guidelines

Eligibility for Publication

Members of the International Graphic Arts Education Association, or students of IGAEA members, may publish in the *Visual Communications Journal*.

Audience

Write articles for educators, students, graduates, industry 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 the audience in the article.

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Prepare manuscripts according to the APA style, including the reference list. Submit a maximum of ten word-processed, 8.5"x11" pages in 12 point type and double spaced (excluding figures, tables, illustrations, and photos). Also, provide a short biography for yourself that can be used if the article is accepted for publication. All

articles must be submitted in electronic form. Articles can be submitted on a CD-ROM or as an email attachment. The text should be submitted in Microsoft Word format. Do not submit documents created in page-layout programs. Call out the approximate location of all table and figures in the text. These call-outs will be removed by the editor. List your name and address on the first page only! Article text should begin on the second page.

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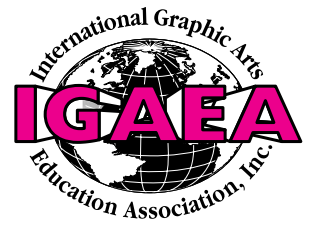
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