Syllabus 2004

Advanced Digital Imaging: A blended approach to problem based learning with media for litigation graphics

Lisa Anderson, Chair - Graphic Design, International Academy of Design and Technology, Doctoral Student- University of South Florida

Chitra Subramaniam, Lead Faculty- Graphic Design, International Academy of Design and Technology, Doctoral Student- University of South Florida

Abstract

Bachelor level students in graphic design are exposed to a variety of different types of media and tools during their education at the *International Academy of Design and Technology* in Tampa, Florida. In *Advanced Digital Imaging*, a senior level class, students integrate core use and knowledge of different types of media into blended, problem based, finished work for litigation graphics using discrete visualization techniques. This challenges students to use a variety of media, integrate them into a finished project, and step through different roles in resolving and creating graphic images. This approach to learning allows for the students to select various types of media technology knowledge, and apply their skills to real world problem solving. Students are exposed to more authentic applications of knowledge and the changing role of problem solving as they develop techniques which foster self-motivation in learning.

Overview of Problem Based Learning in Advanced Digital Imaging

Problem Based Learning (PBL) has been defined as a total approach to education (Barrows & Kelson, 2003). Paris (2001) further discusses that *PBL* is a specific task-based approach which in turn can assist learners with self-regulated learning. Such student-designed inquiries of authentic problems in realistic environments provide more meaningful learning opportunities to students. Perhaps one area for further research is in the field of *Instructional Technology*. As one of the newer fields in education and an area that is constantly evolving from a physical tool perspective, *Instructional Technology* (*IT*) can employ concepts of *PBL* into applied learning research. Some of the unique attributes of *Instructional Technology* and technology integration into existing curriculum may have broad reaching applications for additional research on learner regulated learning and motivation. The increased ability for user control and customization, as well as unique aspects of some types of media may allow for additional research into specific variances in student learning.

To support the concept of *PBL* and to foster motivation with students in learning, the curriculum for a bachelor level graphic design class in *Advanced Digital Imaging* at the *International Academy of Design and Technology* is structured around instructor modeling, scaffolding and immersion into authentic real life scenarios that task students to utilize a variety of previous skills while learning new techniques. Paris' further discusses the importance of *Self Regulated Learning* and the direct tie-in to

Problem Based Learning (*PBL*) approaches which is one area of many current instructional technology research initiatives and areas of research in other fields of education. *PBL's* sequential step based approach to learning (Paris, 2001) can be used to support student motivation. *Problem Based Learning* is best defined as an instructional technique that challenges students to learn. This is accomplished by presenting students with real world problems in authentic scenarios which both challenge and involve students in collaborative analysis (Speers, 2004). The focus of *PBL* is to challenge learners to be actively involved in the learning process and to create meaning from the learning steps.

Paris (2001) further discusses that by modeling and the use of applied instructional scaffolding, *PBL* can be used to encourage and develop learning strategies and techniques in students. The very nature of problem learning allows students the opportunity to control what, how, and when they will complete a task. Students must find information as well construct new ways of using this information for learning. Paris also explains the need for strategy and coordination in addition to choice and control. He also suggests that problem based learning may provide learners with unique experiences in more meaningful ways. Recent *PBL* studies have broad reaching effects in the field of education in specific curricula including accounting, medicine, economics, and special education.

Problem Based Learning Successes

An emerging subject area that is being heavily shaped by *Instructional Technology* and *PBL* is in the field of medical education (Koschmann, Feltovich, & Barrow, 2003). By providing medical students with exposure to the real world problems that they will encounter on a daily basis, educators hope to assist students in developing the necessary skills to self analyze their learning processes as they make important decisions. In this manner, students may build up those skills necessary to make them more efficient practitioners. In one example, Sutherland (2002) conducted research on student acquisition of skills for learning chemistry. A variety of techniques were used to activate student knowledge and retention of information in applied settings. These findings indicate that student performance increased when students were exposed to strategic instruction and support when analyzing real world problems. By providing medical students with the types of problems they may encounter on a daily basis and

the techniques for analyzing and regulating their learning processes, they are better prepared when they become physicians.

Overview of Litigation Graphics

Litigation graphics include visualizations using discrete CAD based models that support accuracy in graphics. Such visualizations are worthy of expert witness testimony because of the concise process used to develop the actual pieces. CAD based systems, specialized software, and various types of digital images including 3d models must be closely matched in each image to fulfill particular requirements. These types of graphics are needed for client interactions, clarification in courtroom cases, and community meetings. Litigation graphics provide accurate visual solutions of how a particular solution will look. These types of graphics are increasing in use and fulfill the needs of specific clients, attorneys, planners, engineers and architectures.

The Process of Activating Student Motivation in Learning

The challenge of instruction in *Advanced Digital Imaging* comes in nurturing and encouraging student to do additional work to fulfill the needs of a particular project and client. Because projects and end use varies considerably, students must be able to apply their skills in media into blended approaches and to encourage students to complete additional research, documentation, photography, and learn new skills to create accurate visualizations. The curriculum has been designed to integrate media and visualization techniques into real world litigation graphic problems so that student's gain exposure to the systemic approach to resolving problems that they will encounter in daily life.

To encourage students to apply technical skills and to motivate them to research the background of each image, client, and potential solution, the curriculum was developed using real problems and broken down into sequential steps with multiple solutions. First, to activate student interest and motivation students are presented with visuals and discussions on a variety of specific topics with an existing example. This includes discussions on historic preservation, right of way acquisition, litigation graphics, and planning and construction impact images. Specific examples of local projects including visuals of how an area looked before and after a particular solution was completed are presented to students. Web research, access to electronic photographic library files, research on history and specific clients is also made available.

The next technique used to present students with authentic problems was to develop scenario problem sheets for each course project (*sample in appendices*). Each scenario presents an open-ended solution that requires students to do additional work to complete the particular image. Specific task sheets with the scope of a project, the rules, overall guiding needs, and final client use are given. These specifications parallel those used in litigation graphic images and present students with real world constraints when working with engineers, planners and attorneys. Supporting each project are

multiple files that students can choose to use including a variety of 3d digital models, blueprints, photographs and specific media types. Students are allowed to select any of the files from a specific folder, modify their own media types, add their own additional media, or scavenge from other media folder to create new content. Final images include combinations of blended media.

The different types of media that are blended together in *Advanced Digital Imaging* projects will vary with the end use and the discretion of the student. This allows for students to explore different solutions and to motivate them to explore these solutions with different types of media integration within tight authentic constraints. Specific steps to problem resolution include students selecting and developing a particular resolution by developing CAD based overlays. Each project can have a variety of topics and images with endless approaches for the student to explore and develop to complete the final piece. Instructor modeling of solutions, field trips, and formal student presentations defining the specific steps involved and supporting research for the images are also components of the curriculum.

Unique Considerations with *Instructional Technology Media* and *PBL*

The very nature of *Instructional Technology* media has direct implications for the concepts used in *PBL*. For this reason, IT research using *PBL* may hold valuable information on how best to develop and activate PBL concepts and how educators may be able to apply this knowledge to other fields. Wooyong & Reiser (2000) discuss some of the advantages of Computer Based Instruction (CBI) and the implications of *PBL* with technology learning. *CBI* instruction can include multimedia CD's, online delivery of content, stand-alone computer applications, or a hybrid combination of any of these. Specific subjects, training modules, and enhancements to existing curriculum have been developed with different types of *CBI* programs. One of the key components of *CBI* instruction is that learners may alter the instruction and control it by their own unique needs or interests. Learners have more control over their instruction because they are actively engaged in various decisions throughout the learning process and the direct implications of their decisions can be easily seen as they progress through a course of instruction (Baker & Mayer 1999). Additional research on *CBI* instruction may provide more data on how best to activate and nurture the specific steps for increasing self-regulation in learning and how to apply this beyond the specific field of instructional technology.

Another aspect of *CBI* instruction is that user information can also be uniquely captured. Learners' specific sequence of steps, time on task, recall of information, and assessment scores can be monitored and collected. Motivation and strategy skills of learners can be analyzed through this collection of data. This may allow researchers to directly study the concepts of *PBL* in specific populations such as learning disabled as well. *CBI* instruction also allows for learners to be presented situational content that mirrors real world scenarios with outcomes that reflect student's processes and end

selections prior to a real world experience. Because these scenarios are computer based they may provide a rich proving ground for students prior to these real life scenarios which are oftentimes more unforgiving (Baker & Mayer 1999).

Still, the ability of CBI instruction and other types of technology integration to include rich media such as audio, sound and animations is also something that is being studied with relationship to *PBL.* Another consideration is the ability for learners to conduct research and additional information and to engage in larger groups. With the advent of the web and increasing access, learners now have a variety of research tools available to them to increase motivation and learning.

Methodology

The study was completed over a period of two quarters, and included three different instructors. Students were both male and female of varying ages and skill levels. Participants were Bachelor's level students in Graphic Design, with little or no knowledge or skills in 3D Studio Max and considerably good skill levels in Photoshop. Photoshop, AutoCAD, Illustrator and 3D Studio Max are the software applications programs that are used in the class to complete the projects. Instructors teaching the course are accomplished professionals with expertise in photography, image editing, and 3D modeling.

In order to measure the level of interest in the course and the motivation of students in completing the projects, a survey containing likert scale items was developed. The scale ranged from strongly agrees to strongly disagree, with five being strongly agree and 1 being strongly disagree. The items were developed using the Dillman's principles of survey development and reviewed by a panel of instructors at the Academy for content validity. The items were revised if necessary based on the input from the reviewers. The items also included open-ended questions related to their overall opinions about the course, the most challenging aspects of the course and their suggestions to improve the course. Such open-ended questions were included to provide the students an opportunity to express their concerns regarding the course, and also to understand their interests and liking towards the instructional materials.

The survey items measure the motivation levels of students in completing the projects, their interest in conducting research and applying architectural and engineering guidelines, standards for a graphic designer in a project, retention, and the interest in learning 3D tools. One of the challenging issues at the Academy is the learning curve involved in mastering 3D Studio Max, the 3D software application that is used in several courses taught. There is a great deal to learn and retain and the students find themselves constantly in need of help to complete projects, using the tool.

The researchers hoped that by introducing real world projects, as problems and assignments in the course, the students would be able to retain more of what is being taught, recollect and apply the information when required to other projects as well. Hence the items on the survey also includes those that measure, the students retention

of 3D Studio Max features, their understanding of what problem based learning is and its application in the course. Students were asked to complete the survey in paper and pencil form at the end of the quarter. The quarter included eleven weeks of the course work. The students also signed release forms to allow use of their completed assignments and projects in the research study.

About 25 students participated in completing the survey. Almost all students either agreed or strongly agreed that problem based learning and use of real world problems increased their motivation levels in completing the projects, increased their creativity, gave them a new perspective of using two or more software applications together to produce the required results, motivated them to look at more than one possible solution to a problem, and helped them learn 3D Studio Max better with an understanding of how the skills could be applied and also helped with retention. In response to the open ended questions, most of the students expressed concern that mastery of 3D Studio Max was one of the most challenging issues they faced in the course. However, the use of real world problems motivated them to learn more and complete the given assignments and projects. In order to improve the course the students were of the opinion that the instructors should provide them with examples of problems in digital imaging that have been resolved and are in use.

Considerations and Areas of Further Research

Problem based learning (*PBL*) research may provide some of the best resources for how educators can improve the instructional process and increase student learning and motivation. This type of learning has many components that blend together unique user needs, motivation, will, sequential steps, and achievement. While a great deal of focus has been placed upon *PBL* research in education and subsequently improving instructional practice to foster better student learning, a great deal of research can still be done to increase this body of knowledge. Instructional Technology is one area of education that may still hold the keys to identifying components to help increase student learning and retention of information. The unique aspect of technology may provide insightful information and tangible data on the processes and steps that successful students undertake in the learning and how these in turn motivate students to learn more.

References

Baker, E.L. & Mayer, R. E. 1999. *Computer – Based Assessment of Problem Solving.* National Center for Research on Evaluation, Standards, and Student Testing. Computers in Human Behavior 15. 269 - 282.

Koschmann, A.C., Feltovich, P.J. & Barrow, H.S. 2003. *Using Technology to Assist in Realizing Effective Learning and Instruction: A Principled Approach to the Use of Computer in Collaborative Learning.* Journal of the Learning Sciences. Vol. 3. 115 - 128.

Sutherland, Louis. 2002. *Developing Problem Solving Expertise: the Impact of Instruction in a Question Analysis Strategy.* Learning & Instruction 12. 155 -187.

Paris, Scott & Paris, Alison. 2001. *Classroom Applications of Research on Self Regulated Learning.* Educational Psychologist 36 (2). 89 – 101.

Wooyong, Eom & Reiser, Robert A. 2000. *The Effects of Self-Regulation and Instructional Control on Performance and Motivation in Computer Based Instruction.* International Journal of Instructional Media. Vol. 27.

Appendices

Student Survey
Advanced Digital Imaging

Please read the following questions and mark your response.

Please *CIRCLE* only one response for each question. Each question is rated on a scale from strongly disagree to strongly agree.

My instructor for this class was.

Lisa Anderson
Chris Leventis
Dawn Carlson

1. I understand the objectives of this course.

Strongly Agree Agree Neutral Disagree Strongly Disagree

2. The problem based learning projects used in this class increased my creativity.

Strongly Agree Agree Neutral Disagree Strongly Disagree

3. The projects in *Advanced Digital Imaging* were interesting.

Strongly Agree Agree Neutral Disagree Strongly Disagree

4. The real world projects in this class increased the amount of time I spent researching my design solutions.

Strongly Agree Agree Neutral Disagree Strongly Disagree

5. My understanding of the role of architecture and engineering with graphic design increased from this course.

Strongly Agree Agree Neutral Disagree Strongly Disagree

6. I understand that real world design problems can have different solutions.

Strongly Agree Agree Neutral Disagree Strongly Disagree

7. I learned new ways of using 3d studio max for real world problems from this course.

Strongly Agree Agree Neutral Disagree Strongly Disagree

8. The course projects increased my understanding of applying design skills to real world design problems.

Strongly Agree Agree Neutral Disagree Strongly Disagree

9. Client needs for imaging impact my design decisions for *Advanced Digital Imaging* projects.

Strongly Agree Agree Neutral Disagree Strongly Disagree

10. My understanding of imaging for right of way acquisition and urban growth increased from this class.

Strongly Agree Agree Neutral Disagree Strongly Disagree

11. My understanding of preserving historic buildings increased from this class.

Strongly Agree Agree Neutral Disagree Strongly Disagree

12. The real world techniques used in this class increased my opportunities for using my photographic images.

Strongly Agree Agree Neutral Disagree Strongly Disagree

13. I understand that several types of software are needed to complete real world projects.

Strongly Agree Agree Neutral Disagree Strongly Disagree

14. My retention of information increased by applying real world projects and - 11 -skills.

Strongly Agree Agree Neutral Disagree Strongly Disagree

14.I understand what problem-based learning is after completing this course.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Please briefly respond to the following questions.

1. **Please describe your overall thoughts on *Advanced Digital Imaging.***

2. **What was the most challenging experience in this course?**

3. **What would you like to improve about this course?**

Student Artwork Release Form to Show Work

Your work has been selected to be shown as part of a presentation at the Syllabus 2004 Conference on Media Education. All student work will be shown to an audience of other professors and educators at this technology and education conference. The following criteria will be used in displaying and using your work.

- **All student work will be appropriate identified in the presentation wither it is in electronic or print format with the students' name, major, and point of contact.**
- **Student work will not be altered nor replicated.**
- **Student work will not be distributed to others.**
- **All work will be shown merely for representational purposes of the caliber and quality of specific course content.**

I agree to allow _____

Please sign your name and date

my work to be shown at with the above parameters met. I understand that my work will not be duplicated nor distributed. And, that at all times my name and contact will accompany my work.