Exploring Instructional Design Issues with Web-Enhanced Courses: What Do Faculty Need in Order to Present Materials On-Line and What Should They Consider When Doing So?

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Abstract

Training faculty to add technology to courses should begin with a needs assessment. Design considerations should be incorporated into training to avoid student confusion in using web pages and completing on-line quizzes. Generally, web-enhanced courses can follow a constructivist approach if instructors have the prerequisite skills in place to use the technology. Faculty may also want to consider the ethical implications in testing students on-line.

When adding online technology to face-to-face (FTF) courses, the importance of addressing the instructional design issues can get lost in the bells and whistles of the new and improved course appearance. Much of the emphasis in the literature is focused on the technicalities of the course creation and, unfortunately, the outcome measurements are questionable because of the methodologies employed. Specifically, the instructor may also be the researcher for many of these studies (Heines, 2000). The general theme appears to be convenience for both the student and instructor and an improvement in the quality and timeliness of the communication and assessment resources. The following discussion will focus on several aspects of training faculty to web-enhance their FTF courses with instructional design issues considered when incorporating technology into a classroom. The recommendations for training faculty will include both direct instruction, characteristics of a behaviorist's approach, and a constructivist's model implemented with a project based assignment for instructors learning to web-enhance their courses.

For the purpose of this discussion, the terms on-line, FTF, and web-enhanced require further definitions. An on-line class offers all of the course material, assessments, student interaction, and assignments over the Internet either using a software package such as Blackboard or WebCT, or the instructor's web site. FTF classes are taught in a classroom with the instructor and students physically present together at a predetermined time and place. All projects, assignments, assessments and class discussions take place during the class time as arranged in a schedule. A web-enhanced class schedules class times for application, practice, student and instructor interaction. Subsequently, lecture information, textbook assignments, and assessments are placed on-line (Pallof & Pratt,

2001, p. 67). The class time for a web-enhanced class is reserved for questions and answers, discussion between students, and applied projects. E-mail is used for delivering most assignments and a website is used for student assessments and exploration of related class materials. A web-enhanced course is also referred to as a hybrid course in the literature. The main difference concerning the terms hybrid versus web-enhanced appears to be that a hybrid course actually decreases the time students are required to be in class (Leh, 2002). Because of the common usage in the literature of the two terms to be utilized interchangeably, web-enhanced and hybrid course are synonyms as a definition. However, the term web-enhanced is used in this discussion by the author.

General Instructional Design Concerns for Web-Enhanced Courses

To begin to design a web presence to supplement a FTF course, a needs assessment should be a logical starting point. What do faculty need in order to present materials on-line and what should they consider when doing so? From both the literature and the author's experience in assisting and mentoring faculty in adding technology to their instruction, needs fall into three areas: technical, instructional, and course evaluation requirements. Other researchers have expanded on these groupings to include learner analysis, functional analysis, task analysis, and into specific activities, i.e. testing, lecture, interaction, and administration (Danielson, Lockee, & Buron, 2000; Keefe, 2003a). Vrasidas and Glass (2002) build a compelling comprehensive framework of "context (e.g. institutional policies, teacher, technology, content), structure, learner control, social presence, feedback, dialogue, and interaction" for studying distance education (p. 35).

Berge, Collins, and Dougherty (2000) address the design of any course to include: course management documents such as syllabi, meeting times, instructor contact information, course content, interaction – communication between students and between the instructor and the students, other resources or links, monitoring of ongoing student learning such as quizzes, and final assessment. However, the suggested groupings incorporate many of these details especially when using a template approach for training faculty to add on-line content to FTF courses. Also, by having a web-enhanced course, the student interaction and discussion in a physical classroom simplifies many of the issues when a course is not fully on-line. This issue of student communication is discussed in further detail later in this paper.

Technical Instructional Design Issues and Recommendations

Technical areas include the tasks necessary to access the web site (assuming the web site is using a packaged course delivery system such as Blackboard, WebCT, or an in-house system), the steps and sequence necessary to build a course using the templates, and retrieving electronic help and support. Because of access and privacy issues, the web site has a different appearance for students than it does for instructors. For example, students are not able to access the test creation areas, discussion and announcement postings (they can respond to a posting, but not create a posting or announcement), or grade information for other students in the class. Generally, the commercially available course delivery systems provide the instructor with a control panel icon that allows

access to these areas and the students do not have this image displayed as an option. To teach faculty how to build an on-line course from scratch, including loading and securing the web site, is not addressed in this discussion. A simplified analogy would be similar to teaching a person how to drive a car that is already built, not how to build the engine and frame, then drive the car. For this paper, the assumption is made that the educational institution is using a commercial or in-house delivery system for their on-line and web-enhance courses.

The behaviorist approach, characteristic of Skinner's programmed teaching design of modeling and direct instruction, is recommended by the author for teaching the technical areas of web-enhancing courses (Molenda, 2002). This approach seems better than a less structured methodology for this area because these beginning skills are prerequisites to developing a course. After the tools are learned, then a project-based activity will begin. Then, in a more constructivist methodology of "learning by doing", have the faculty construct their own web pages as a project-based exercise while acting as a facilitator during the creation and implementation stages (Christensen, 2003, p. 236). Depending on the project and instruction, behaviorist educators could also reason correctly that this methodology is characteristic of guided practice.

As a starting point, Pallof and Pratt (2001) suggest that faculty have input concerning software and governance issues. Although their book is directed to a total on-line environment, their recommendations can apply to web-enhancing courses, as well. They recommend a series of questions to facilitate faculty in choosing what course material is suitable for on-line conversion. These questions help faculty draw on their prior knowledge, the course content and structure they have already developed for their FTF course. The primary change is in the delivery – digital instead of paper copies of the syllabus, assignments, and quizzes. To assist the faculty in learning the areas of the web site to be used for the course, a suggested checklist of items to be posted for a first encounter could be presented, modeled for specific tasks, and then followed with directed practice on a site of their own. Training usually begins with developing their personal faculty information and assisting them in loading the syllabus onto the site followed by any course content or announcements the instructors feel comfortable in posting to the web page.

After successful completion of these activities, participants should explore file formats and the instructor's resource materials provided by the textbook publishers. The advantages and disadvantages of using the textbook provided resources will be addressed and the instructors will be encouraged to accept or reject all or part of these materials. If indicated by the faculty, the communication areas and student evaluation areas will be addressed and the steps necessary to use and implement these areas will be presented. However, for beginning faculty, posting a syllabus and some content may be sufficient for a first implementation experience for their course.

In general, some factors to keep in mind for instructors placing course syllabi, content, and quizzes on web sites are: text appearance, "windowing environments", (navigation and layout of the web page), and "visual complexity" (Berry, 2000, pp. 47 - 48). Visual complexity can easily overload the students with too many graphics and too little information. The other issue is if the pictures and graphics will download on a users home machine fast enough to facilitate access. Berry advises, "Visuals which have not been related to the accompanying text may not be

understood and may actually work to confuse or disorient the learner" (Berry, 2000, p. 49). Sweller, van Merrienboer, and Paas (1998) referred to this type of additional effort as "extraneous cognitive load" (Sweller, van Merrienboer, & Paas, 1998, p. 259). A poorly designed web page, quiz, or digital images that requires the student to apply additional effort to manage the information defeats any advantages to flexibility and convenience for the student or the instructor (Sweller et al., 1998).

Instructional Design Issues and Recommendations

The next area to be considered is the instructional aspect of creating the web-enhanced course. Some of these concerns involve technical operations, such as appropriate file formats. However, the initial focus is best directed to the instructional concerns of student access, "demands on the reader," and utilization of the web site used to enhance a FTF course (Wolfe, 2001, p. 3).

A constructivist approach for the instructional use of web sites is evident in some of the literature using the technology to help students adapt a pro-active attitude in learning. For example, Berge, Collins, and Dougherty (2000) indicate that "[s]tudents in Web-based courses can become problem solvers involved in real-world problems as they take responsibility for their own learning" (p. 32). Certainly, the open ended learning environments (OELE) rely on technology to provide resources and tools to assist students with projects (Hannafin, Land, & Oliver, 1999). However, the behavioral approach of teaching tasks is rarely addressed and only assumed as a prerequisite for using the software. Direct instruction for the students in these courses is implied for the beginning technology user but is not explicit in laying the foundations for success in these discussions. Researchers, like Pallof and Pratt (2001), make recommendations such as, "There is also a need for student orientations to online learning"(p. 11). However, they do not discuss many of the implementations and methodologies of this type of instruction.

Addressing the characteristics of the students using the technology to access course content and quizzes, Johnson (1999) categorizes learners into two categories the educated affluent and the less educated looking for work. Johnson (1999) notes that

> The more educated and affluent customers will be literate in technology, motivated to seek further education for employment and career advancement, and short on available time for education. The less educated and affluent will also be short on time, but less likely to have ready access to technology in the home. (p. 186)

One of the most important considerations faculty should have concerning the instructional design of their web materials is student accessibility (Powers & Guan, 2000). Plan for the lowest common denominator when considering the student's resources:

1. Operating system version and platform
2. CPU – speed and model
3. Memory

4. Connection, i.e. dial-up or Digital Subscriber Line (DSL)

With the student's hardware in mind, faculty are encouraged to be aware of what technology the students have available to them when developing course materials for use on the web (Johnson, 1999; Pallof & Pratt, 2001). Therefore, Johnson (1999) advises that "the objectives of the instruction must be compatible with the delivery mechanism" (p. 150).

For web-enhanced courses, the decision of what to put on-line and what activities and concepts to conduct in FTF classrooms is difficult and will usually rely on what the instructor perceives as appropriate for the students and subject. The evaluation of students probably has more design and ethical concerns for instructors than the technical area. As Joinson and Buchanan (2001) mention, "on the internet nobody knows if your dog is doing your homework for you" (pp. 234-235). However, assessment in the on-line classroom "must be addressed as part of the content design" (Harris, 1999, p. 152). While many instructors avoid on-line testing, some have had great success in allowing students to take quizzes at their convenience instead of in a classroom with predetermined time constraints (Joinson & Buchanan, 2001).

Therefore, evaluation difficulties and possible ethical issues are legitimate areas of concern for faculty. To address these potential and valid problems, instructors have been attempting to alleviate cheating by first verifying the identity of the test taker and/or by proctoring the exams themselves. Some ideas for validating the test taker's identity have been suggested by Johnson (1999), which include various levels of proctoring, use of video cameras attached to computers, and asking for personal information for verification. The author has found these activities unnecessary and potentially intrusive on the learning experience for students. The use of immediate feedback and the time gained in class by not having quizzes FTF is a great advantage and the possibility of unethical behavior should not deny students the benefits of this activity.

Another possible solution to help address concerns of cheating and still provide a flexible and viable way for student evaluations is to use randomly selected questions. No two tests presented to students are exactly alike. If the publisher provides quality instructor materials, using these test banks might be an option in developing quizzes. Generally, the test banks that are provided with the courseware have hundreds of questions per chapter of which only a few can be chosen to display. The instructor is not required to use these pre-packaged materials from the publisher. If desired, test banks can also be created and imported into the web site by the instructor to better align with the lectures and course content. The examination program that is packaged with the most of the course delivery software programs will also allow for the quizzes to only be given during certain time periods and can be further restricted to the host computer's identification number or Internet Protocol (IP) designation. The instructor could use this feature to designate certain computers in a college computer facility where the exam could be delivered and monitored. Students would not have access to the exam at any other location, but could still have access to the course materials, discussion area, and instructor's information from any computer that is connected to the Internet.

For faculty who do not feel comfortable with on-line quizzes taken outside of the classroom, the FTF class time could be used for a computerized exam (if computer rooms are available). The advantage of automatic grading and randomly generated quizzes

would still remain with the security concerns minimized. The paper and time to create exams is also a benefit with a digital quiz. In only one semester, the author has saved approximately 17 reams of paper by computerizing quizzes and countless hours at the copy machine. The exams can easily be revised and reviewed, unlike the paper versions. Certainly, some faculty may only use digital quizzes for practice and want traditional exams for grades, in other words using the web for formative and not summative evaluations (Bett, French, Farr, & Hooks, 1999; Joinson & Buchanan, 2001).

To facilitate instructional design, use the rich text format (RTF) for on-line document files so students are not required to have an expensive word processing program to open files. Choosing the File Save As and specifying the file type as RTF can convert existing Word or WordPerfect files. Files can also be saved as hypertext mark-up language (HTML) and will open in any browser window such as Internet Explorer or Netscape Navigator.

Pictures can say a thousand words, but avoid large sized files that take thousands of seconds to download. To reduce size, save pictures as GIF (graphic interface files) or JPEG (joint photographic expert group) formats. Pictures do not need to have high quality settings for use on web pages unless the subject matter demands this feature, i.e. and art class studying paintings in detail.

When sending e-mails or posting discussion questions on web sites, read what you intend to send, and read it again. Remember, students cannot see your body language, voice intonation, or facial expressions. Be clear, positive, and avoid sarcasm at all costs. Read your e-mail as if you were the student receiving it. Save confrontations and bad news for a private FTF meeting. You have this option because your students are physically in the classroom at preset times – use this opportunity to communicate sensitive information whenever possible. White recommends using the phone if students are unable to meet me in person (White, 2004).

Evaluating the Web-Enhanced Course

The final area to be addressed is the evaluation of the course design when presented to students. This area is somewhat difficult because students cannot take the same course twice with the same instructor in a different format to determine which had better measurements of success. Anastasiades and Retalis (2001) advocate that simply evaluating the success of the marriage of technology and instruction is insufficient "to reverse the linear traditional model. The creation of an open learning environment requires the evolvement of the teacher's and the student's roles, as well as the optimum use of the training tools in the direction of changing the learning approaches and training methods" (Anastasiades & Retalis, 2001, p. 48). The general theme of the literature leans towards constructivism and indicates that success in adding technology requires changes not only the delivery of certain aspects of the course, but also in the class environment.

Unfortunately, much of the data collected in the research appears to be dependent on student opinions and the instructor's interpretation of their responses. Heines (2000) concedes that "one must recognize that the fact that students react favorably to a course

Web site is not evidence that they actually learn better because of it." (¶ 51). His study was previously mentioned because of the possible evaluation of his own students, which is not made clear in the article. However, Heines did disclose his bias and other variables that may have compromised his findings. His study is worth mentioning because it illustrates the difficulty in evaluating web-enhanced courses. He determined that web-enhancing was successful because of better grades obtained by students in web-enhanced courses compared to previous students in the same course that was not web-enhanced but had the same instructor. Obviously, an experimenter effect limits the credibility of this study. The qualitative data collected in this study, and others that are similar is perhaps more valuable for determining the reasons for the possible success of these courses (de Vasconcelos, 2002; Heines, 2000).

Poindexter, Heck, and Ferrarini (2000) title their article, *Hybrid Courses: Determining the Effectiveness of Using the Internet*, but fall short of describing their methodology. I assume that faculty were polled as to what Internet elements were effective in relation to the time spent. The interdisciplinary approach is unique to this study as the researchers evaluated courses in information systems, economics, and engineering. The areas considered valuable changed by discipline; however, some areas were universally accepted as worthwhile endeavors for faculty. These features were: group e-mail announcements, online syllabus, and online handouts/assignments. Student to student e-mail, posting grades, and links to outside online readings were also reported as "highly useful for time spent" by two of the three courses by instructors (Poindexter, Heck, & Ferrarini, 2000, p. 8). The general theme of this article as compared to the rest of the literature is faculty focused and faculty evaluated for effectiveness.

Haile (1998) evaluated a faculty training program to promote multimedia technology into instruction of courses at Hofstra University in New York. In documenting the implementation of the program, the faculty were asked what areas were used when web-enhancing their courses, i.e. e-mail, Internet, PowerPoint, and specific software packages. The methodology in the summative evaluation is not provided in this article. However, the results were positive concerning students working better as teams, better at self monitoring on writing and skills analysis, and "learned certain concepts through technology that were difficult to learn without the technology," appeared more "motivated and enthused" about a web-enhanced course, and participated more in class discussions (Haile, 1998, p. 7).

Leh (2002) evaluated her own courses through action research using discussion questions posted on her site, observations, interviews, and surveys. She reported that "barriers also existed in a hybrid course….Students with low technology skills felt pressured and anxious" (p. 36). Leh continued with the evaluation to report that despite concerns, students would select a hybrid course if that opportunity was available. This study is valuable because of the scope of the data collected which included twelve course sections of three courses over two years. Leh concluded that hybrid allows students and faculty the option of using the tools of their choosing, depending on the circumstances, when learning and teaching a course. This attitude and conclusion is very characteristic of constructivist methodology in creating a flexible environment for learning and teaching.

Nicoll and Laudato (1999) completed one of the best evaluation models and studies that was found in the literature. This study used formative and summative

evaluations to assess the influence of incorporating on-line materials to FTF courses. Their formative evaluation instruments included surveys to students and faculty while the quantitative data involving the number of visits to the web sites and help desk inquiries were used for summative evaluation results. In their study, Nicoll and Laudato (1999) found that:

> …using online enhancements increased the time that students were involved in learning tasks, such as accessing other online materials related to the content of the course, reviewing lecture notes to gain clarification, and completing assignments on time. Engaged time on-task is one factor that has been found to contribute to increase student learning. (p. 8)

This study also reports increased satisfaction from students with on-line quizzes because of the immediate scoring and feedback. However, positive student feedback is not always related to increased learning and should be considered accordingly (Heines, 2000). Another finding was that with a pre-designed course delivery system, faculty "responded positively" to web-enhancing courses without "extensive technical knowledge" (Nicoll & Laudato, 1999, p. 10). This study used qualitative summaries and quantitative data in an attempt to validate their findings and recommendations.

Conclusion and Summary

In conclusion, when adding online technology to FTF courses, most of the research agrees that this change or supplement is a valuable addition both for faculty and students. Most of the research does not agree with Oppenheimer's (1997) opinion from about seven years ago that "there is no good evidence that most uses of computers significantly improve teaching and learning" (p. 45). However, many other opinions are available. While most are favorable, several, such as Wang and Reeves (2003), point to the issues and problems with implementation and the research itself. Robertson (2003) criticizes the commercialism of some studies and the unfulfilled promises that border on an ideology she terms "technopositivism" (p. 282). Vrasidas and Glass (2002) voice concern about the technical competencies and support given to teachers when teaching in distance educational settings when they observe the following:

> For example, if teachers are not capable of using the technology effectively, they will not be able to model expert behavior for students nor help students who are having difficulties with the technology. Another important component of context is support provided to the teacher, which will influence interaction and the success of the program. (p. 37)

This paper does not fully address all of the issues and concerns with educational technology. The discussion presented is not intended to advocate only one method of training faculty in the area of web-enhancing courses. Many instructors are well acquainted with on-line resources in presenting their courses and would mainly be interested in exploring the instructional design components of this type of training. Other faculty would benefit from the step-by-step instructions of the particular software used in presenting and converting their existing materials to on-line recourses. To provide a successful training program, the facilitator would be advised to carefully interpret the needs assessment that was recommended at the beginning of this paper before developing the curriculum. The presenter would also need to adapt their instructional style to the group involved in the training. For this limited discussion, the author has assumed the training is desired and appropriate for faculty. If this assumption is valid, then the evaluation of the impact on student learning and success in college courses is needed to ascertain if the perceived benefits are worth the material and intangible costs associated with these technological enhancements.

Implication of Author's Research for Practice

Educators need to be cautioned that a poorly designed course cannot be saved by technological enhancements. Nicoll and Laudato (1999) advise to "keep the emphasis in training on the functionality and instructional purpose of the technology, using the technology as a tool and not as an end" (pp. 9 - 10). Adding technology to education is not a new concept and began with radio broadcasts, television, and currently the Internet and computers. Every new device appears to be the answer to better teaching and learning. However, each innovation should be examined for its effectiveness and costs. This examination has not been done with past changes, and technology in education is not presently being evaluated fully either. Agalianos (1996) notes that "the social processes and the political decisions involved in the production and 'consumption' of IT in education are largely ignored" (p. 2). The solutions proposed by the vendors and creators of technology are easy for policy makers to adapt while possibly ignoring the larger issues in instructional design of courses. This paper does not fully address all of the implications of the technology *band-aide w*hen attempting to correct larger more complicated issues in the delivery and success of public education.

This research concerning web-enhancing courses has several implications for practice. Because of the perceived costs savings and popularity of web courses with students, the trend of converting courses to on-line delivery continues. The author believes that training faculty to adapt to the technology available may empower instructors with the tools needed to function and flourish economically in this new construct of computerized delivery of courses. Not as revolutionary as Horton and Freire (1990) in addressing social problems and liberating the oppressed, but a reasonable reaction to the change in course development and distribution. Often, community colleges are desperately seeking individuals who can teach on-line courses and rural students are frequently presented with a web-based course as the only alternative for taking a required class. Therefore, training faculty to web-enhance courses will assist

students with a preview of an on-line environment and ease instructors into using technology in their courses.

This paper has discussed the technological, instructional, and evaluation of web-enhancing courses. Somewhat absent or hidden in the present literature is accepted criteria to evaluate these courses and their effectiveness. In general, students appear to enjoy and use the online materials and the instant feedback for quizzes and grades is appreciated. Faculty utilize the web for a variety of reasons and are being pushed by the requirements in their classrooms for current resources that can be quickly obtained.

The instructional design issues that must be evaluated in these courses include the faculty decisions surrounding postings and web usage and its relationship to student success. The preliminary findings indicate that this new learning environment is inclined to a more constructivist methodology with open learning environments that include case and problem based activities. Technology adds flexibility for participating students but must be accessible before learning and creativity can occur. The direct instruction of learning how to use the tools appears to be a prerequisite somewhat ignored by practitioners and assumed in our fast-paced electronic surroundings. Regardless of the course delivery, educators should not forget students while they are web-enhancing their courses and keep the presentations simple, and well organized - as successful instructors have always done with their course supplements. Adding technology does not need to add barriers to student success and should encourage and enlighten their learning and exploration of the course content.

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