DOCUMENT RESUME

ED 444 462 IR 020 117

AUTHOR Youngman, Timothy; Gotcher, Lee; Vafa, Shahrzad; Dinsmore, Sharon; Goucher, Orval B.

TITLE A University Design Team Approach: Developing Courses for On-Line Distance Education.

PUB DATE 2000-00-00

NOTE 7p.; In: Society for Information Technology & Teacher Education International Conference: Proceedings of SITE 2000 (11th, San Diego, California, February 8-12, 2000). Volumes 1-3; see IR 020 112.

PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.

DESCRIPTORS Constructivism (Learning); *Distance Education; Formative Evaluation; Higher Education; *Instructional Design; *Instructional Development; Instructional Effectiveness; Systems Approach; *Teamwork; World Wide Web

IDENTIFIERS *Course Development; *Online Courses; University of Houston Clear Lake TX

ABSTRACT

The University of Houston-Clear Lake has developed a systematic design process to use in facilitating the development of online distance education courses. The process incorporates three semesters, during which faculty members have the opportunity to consult with a design team that consists of instructional designers, World Wide Web developers, graphic artists, media specialists, and instructional programmers. This paper presents an outline of the process, describes each step in detail, and provides a framework for formative evaluation. The first section of the paper considers the theoretical background of the process. The design team is described in the second section, including the members of the team and process management. The pre-production, production, and post-production stages of the process are detailed in the third section. (Author/MES)

A University Design Team Approach: Developing Courses for On-line Distance Education

Timothy Youngman
Lee Gotcher
Shahrzad Vafa
Sharon Dinsmore
Orval B. Goucher
University of Houston-Clear Lake
Houston, Texas, USA
Email: youngman@cl.uh.edu; gotcher@cl.uh.edu; vafa@cl.uh.edu; dinsmore@cl.uh.edu; goucher@cl.uh.edu

Abstract: The University of Houston-Clear Lake has developed a systematic design process to use in facilitating the development of on-line distance education courses. The process incorporates three semesters, and during which, faculty members have the opportunity to consult with a design team that consists of instructional designers, web developers, graphic artists, media specialists, and instructional programmers. This paper presents an outline of the process, describes each step in detail, and provides a framework for formative evaluation.

Introduction

This paper addresses the implications for redesigning traditional university courses for delivery over the Internet. The University of Houston-Clear Lake has adopted a unique perspective whereby faculty members have a team of professionals who serve as consultants throughout a three-semester design process. Within this framework, a systematic procedure has been developed to facilitate the refashioning of the courses. Specifically, this paper outlines a theoretical perspective for the development of on-line distance education, discusses who should be involved in the process, presents a systematic procedure for development, and discusses methods for evaluating the effectiveness of the course.

Theoretical Background

Over the past several years an increasing number of educational institutions have begun to offer on-line distance education as a viable alternative to more traditional forms of classroom instruction. There has been a great deal of discussion about which pedagogical foundation is appropriate for classes delivered over the Internet. Historically, this debate has focussed on the differences between the Instructivist and Constructivist approach. This is a meaningful consideration since classes that were originally designed for the traditional setting are afforded different instructional activities and learning opportunities that were not perceived or even possible before Web-based instruction (Dabbagh & Schmitt, 1999). Accordingly, many classes will undergo pedagogical reengineering as the process of learning over the Internet is examined more closely (Dabbagh & Schmitt, 1999). Because of such Web features as synchronous and asynchronous communication, searchability, global accessibility, and interactivity (Dabbagh & Schmitt, 1999), it can be argued that a movement toward a more Constructivist approach can easily be facilitated. Constructivism recognizes that learning is an active process in which learners construct their own concepts rather than acquire knowledge directly from an instructor (Duffy & Cunningham, cited in Dabbagh & Schmitt, 1999). According to this perspective, the on-line course should create an atmosphere that recognizes the needs of the learner rather than those of the instructor (Berg, 1999).

Without a well-developed design process, the on-line curriculum becomes little more than a replication of traditional Instructivist-based curriculum. Accordingly, tools and strategies such as videoconferencing, file exchange, electronic libraries, virtual cafés, whiteboards, role-taking activities, and student dialogues should be integrated to encourage and support tele-apprenticeship (Bonk & Cunningham, 1998). But integrating these technologies within the framework of a well-designed instructional program can be difficult even for the most

experienced faculty member. Accordingly, a systematic process is necessary to ensure a focus on all of the elements of Internet-based instruction. There are concerns about whether or not a systematic design approach can be used to develop classes that rely on more Constructivist pedagogy. However, it can be argued that Constructivist values such as collaboration, personal autonomy, reflectivity, active engagement, personal relevance, and pluralism are objectives often overlooked by instructional designers (Lebow, 1993). In essence, Constructivism is often treated as a method when in fact it is really a philosophy, and instructional systems design is seen as a philosophy when it really is a method (Lebow, 1993). Therefore, the principles of instructional design based on Constructivism emphasize the affective domain, make instruction relevant to the learner, support self-regulation, and promote autonomy. In reality, instructional design under the context of the Constructivist philosophy includes a concern for the motivational aspects that are not often considered within the traditional approach.

The Design Team at the University of Houston-Clear Lake has created a process to guide their work in consulting with faculty members developing on-line courses for the first time. This ensures a focus on a course design that will provoke intelligent responses to the learning materials, context, and environment (Berge, 1995). Considerations for graphics, media, immersive technology, and effective text must all be embedded within the process to ensure that students will be equipped with the resources and motivational elements they need in order to achieve success. The most important challenge of the Design Team is to support faculty members in developing collaborative assignments, facilitating active on-line communication, and promoting the development of critical thinking and research skills (Palloff & Pratt, 1999).

The Design Team

Members of the Team

The Design Team at the University of Houston-Clear Lake consists of skilled professionals with expertise in a variety of areas. Accordingly, it was important initially to establish clear roles and responsibilities in order facilitate a systematic development. Otherwise, it is difficult for people to have clear expectations of what is required of fellow team members. The Graphic Designer assists in evaluating content to determine the need for visual information and immersive technology and creates images, interface elements, and animations using a number of graphic, 3D, and multimedia software applications. The Instructional Designer serves as the team leader for the project, performs the needs analysis, task analysis and instructional analysis with the Subject Matter Expert, and reviews and helps to revise course content. The Instructional Programmer evaluates content to determine the need for CGI programming, database integration, and forms; and writes code to integrate programs into Web pages. The Multimedia Specialist assists in evaluating content to determine the need for creation of multimedia and immersive technology and creates video, graphics, animation, audio and other multimedia elements. The Subject Matter Expert identifies the course's needs, establishes the goals, objectives, instructional events, and readings, writes course content, writes tests and/or quizzes if applicable, develops criteria for student evaluation, reviews and approves all products developed by the design team, and signs off on all completed components. The Web Developer creates the interface, navigation, and theme for project Web sites; evaluates content to determine the need for HTML, CGI programming, database integration, and forms; develops HTML pages for the course Web site; and conducts training sessions for the Subject Matter Expert.

Process Management

The process of creating Web based instruction involves a team of developers from many disciplines. In the development environment, some of the team players may not be able to attend all scheduled meetings for a variety of reasons. The response to this dilemma was to create an Internet-based resource, known as a Project Support Site or PSS. Team members can coordinate and exchange information using this site. The features that are included in the PSS help team members to successfully telecommute while working on a project with a deadline. In order to ensure its effectiveness, team members were asked to verify the features needed to simplify work tasks with the Internet serving as an intermediary. The announcements feature allows team members to receive news and announcements that affect everyone involved. The file exchange allows members to share files, graphics, and documents and is accessible to all project team members. A simple list of email addresses, phone or fax numbers, room numbers, and work hours is listed on the site to help team members maintain contact; password

protection is necessary for this feature. A chat room is also available when other means of communication are not feasible, and each team member also has quick access to the home page for the current project. Calendars and timelines are maintained on the Web site to serve as a reference to deadlines and delivery dates, which helps to keep all interested parties informed of the progress. The maintenance of a PSS for the duration of a project results in an archived source of information that is used to evaluate the process. This captured information serves as a reference system for designing and building future Internet projects. The PSS can be pictured as a common thread that runs through the length of the development process.

The Design Process

The process of developing an effective on-line course is an extensive, lengthy procedure, because it requires a paradigm shift from a traditional methodology. Even the best educators must reevaluate their instruction to ensure its capacity to be integrated into a Web-based format. Considerations for graphics, media, immersive technology, and compelling text must all be part of the process to equip students with all of the resources they will need in order to be successful. Since not all approaches are appropriate for Web-based instruction, some examination of teaching techniques must be incorporated into the development process. This may appear to be an arduous task, initially, but through a systematic procedure, the process is isolated into concise steps concluding with distinct end products. As each step is finished, there is an opportunity for readjustment and change to ensure the best possible outcome at the completion of the process. Within this context the Design Team adopted a modified Dick and Carey (1996) model to ensure that the procedures for developing Web-based classes are unified and systematic. This process incorporates three distinct stages, Pre-Production, Production, and Post-Production.

Pre-Production

During the Pre-Production stage, the design team for the project forms, and an initial meeting is held with the Subject Matter Expert to conduct the course analysis. This helps the team understand some basic information about how the class has been taught in the traditional setting, gain insight into the faculty member's personal strategies, and learn about the student population. From this point, the team splits into two groups. The Instructional Designer continues to work with the Subject Matter Expert as the rest of the design team creates the basic interface and prototypes for the Web pages. The outputs of this stage include a design document, a rapid prototype of a content unit, and a horizontal prototype. The design document outlines the framework of the class, while the horizontal prototype demonstrates the metaphor, navigation, and organization of the Web site. All of these are analyzed through one-to-one conferences and expert reviews before the Subject Matter Expert is asked to sign off on the product.

The design document represents the output from the initial stages of the instructional design process. In consultation with the Subject Matter Expert, the Instructional Designer works through a systematic approach based on the model suggested by Dick and Carey (1996). The process begins with the task and goal analysis, with the purpose of determining the intended outcomes of the course from the instructor's perspective, representing both content specific and affective goals. This provides an overarching perspective of what the class should accomplish. At this point, the Subject Matter Expert attempts to break the main goals into smaller topic areas that can be covered throughout the class. Based on this information, goals and objectives can be established for each individual topic area. Depending on the nature of the class, some faculty members may have very specific goals while others may take a more open-ended approach. At the completion of the instructional analysis, there is some discussion of how students will be assessed, focusing on measures that are appropriate for Internet-based classes, such as rubric grading systems. Once these initial guidelines are conceived, instructional events are established to meet the course goals. While this process first seems to represent a very rational approach to course design, it is much more iterative in practice. Decisions made later in the process often create the to need a reexamine earlier conclusions. The purpose of this effort is to produce a design document to articulate the basic structure of the course. This includes outlining the main course goals, the goals and objectives within each smaller topic area, the instructional events, and a plan for the assessment of the learners.

Unlike many instructional design situations, the delivery medium -- the World Wide Web -- has been pre-determined for our courses. Rather than looking at whether the Web is the right medium, the task in this situation

involves finding the right blend of Web technologies and print-based activities to achieve the goals of each course. One of the first challenges is to convince the Subject Matter Expert that delivering courses via the Web takes a very different approach from the conventional classroom. It is more involved that just putting pre-existing PowerPoint slides into HTML format. The second challenge is to help the Subject Matter Experts understand capabilities of various Web technologies and to visualize how these technologies can be creatively applied to their course. There are numerous Internet technologies (text, graphics, animation, sound, interactive quizzes, video, chats, bulletin boards, email, newsgroups, video conferencing) that should be considered in putting together a Web-based course in order to ensure the content is delivered in the most appropriate manner for achieving the course goals. The third challenge is to make the development of the course content and Web site as efficient as possible. To address all of these challenges, a rapid-prototyping approach has been adopted for the Pre-Production phase of each of our Web-based course projects.

Rapid-prototyping, which is commonly used in the software development industry, involves experimenting with the design ideas and issues even while the requirements analysis (or content analysis in the case of instructional design) is being conducted. Specifically, through rapid-prototyping the design team can experiment with interface design and the incorporation of a variety of Web based technologies until the right approach for the subject matter of a given course is found. The samples that are generated help the Subject Matter Experts to visualize the capabilities of these tools and to begin seeing advantages and disadvantages of using each technology. Once the design team and the Subject Matter Expert have seen concrete examples of how technologies such as bulletin boards, chat rooms, animations, video, video conferencing, or sound can be used, they are able to think more creatively about how to apply these tools to the course objectives. Rapid-prototyping facilitates formative evaluation to ensure that the chosen techniques actually achieve the desired learning goals and objectives. Through rapid prototyping the design team is able to help Subject Matter Experts understand how Web courses are different from conventional classes. This also enables Subject Matter Experts to choose the appropriate technologies to achieve their course goals.

At the completion of the Pre-Production phase, there are three main outputs. The design document specifies the content to be developed for the course. The rapid prototype provides a framework to guide Web page development. The horizontal prototype of the Web site provides the context for how all of the elements of the course will be unified. These outputs are analyzed through one-to-one conferences and expert reviews before the Subject Matter Expert is asked to sign off on the final products of this stage.

Production

The Production phase incorporates the process of developing the actual content for the Web site. The definition of content at this point is rather loose and may include textual information, graphics, descriptions of activities or assignments, job aides, test and quizzes, and other instructional events. During production, the design team uses a step-wise development process, completing one instructional unit completely before moving on to the next, but the content does not need to be created in the sequence in which it will be used. The Subject Matter Expert with the help of Instructional Designer specifies the content for the site. Information that is not available in the course textbook (if applicable) is emphasized, or additional content is added that will help to better explain the important concepts. As the content is specified, the Subject Matter Expert and the Instructional Designer work with the rest of the team to examine ways to make the content and direct instruction meaningful and engaging to the student. This involves a consideration of options available through the HTML/script coding, the media creation, and the use of immersive technology.

As the textual content, media, and immersive technology are created, they are integrated into the Web site using the template created during Pre-Production. An important part of the process at this level is considering the use of instructional programs that can be integrated into the Web pages using server-side applications or Java coding. Essentially this means that small programs can be run from within the Web pages to perform specific actions. As the Web Developer and the Instructional Programmer examine the content, they may have suggestions for ways to make it more compelling through the use of these programs.

Media creation is the main way that the content of the site is given greater force. Images can be used to demonstrate concepts that are difficult to explain in textual terms and to reinforce ideas expressed in written form. As the content of the site is developed, the Instructional Designer and the Graphic Designer work together to identify areas where images are most appropriate. Generally, images are only used for a sound educational purpose, and the design team does not recommend adding images only for their aesthetic appeal. Other media that

may be created for the site include video, animation, and audio, depending on what is required to support the content. The Graphic Designer and the Media Specialist review the content and consult with the Subject Matter Expert to make recommendations about what media is helpful to represent some concepts.

The Multimedia Specialist and Graphic Designer provide several different types of media for inclusion in the online courses, including audio, video, animation and interactive segments. Audio and video clips are used to reinforce pertinent information or to provide relevant anecdotes to increase the effectiveness of the content presentation. Interviews with Subject Matter Experts are developed for audio or video to provide relevant information to students, therefore adding a humanizing touch to the Web site (Bonk & Cummings, 1998). These interviews are kept to approximately one minute in duration to minimize download time. Video conferencing between the instructor and students is also possible in order to provide personal feedback to the student and to foster interaction (Bonk & Cummings, 1998). Immersive technologies such as Quick Time VR and Virtual Reality Modeling Language (VRML) pull the user into a simulation of reality on the Web. Shocked Director files can create interactivity to facilitate lessons such as chemistry experiments. The use of Macromedia Flash has been examined as a way to improve download time. Since Flash is a vector-based animation and multimedia tool designed for Web output, the files are small, fast loading, and produce dramatic results. All of these technologies are considered in attempting to increase the effectiveness of the content presented through the Web.

Once all of the components for an instructional unit are integrated into the Web site, it is ready for a series of evaluations. This helps ensure that all the pieces are functioning together and provides an opportunity to judge whether or not it is likely to be effectively used by the students. Formative evaluation involves the collection of data and information during the development of instruction in order to improve effectiveness and efficiency. This determines the weaknesses so that revisions can be made as necessary. Formative evaluation provides feedback that is used for improvement of the products at all stages within the instructional design process (Seels & Glasgow, 1997). During the Production phase, following the Dick and Carey (1996) model, the formative evaluation is divided in two parts, content evaluation and learner evaluation.

In content evaluation, the designers and experts evaluate the content of the instruction. This evaluation is conducted throughout the development process, and the evaluators review the goals, objectives, environment, learner analysis, task analysis and instructional materials. The content is evaluated to determine if the goals and objectives were met and to find inadequacies and flaws. The entire team reviews and makes corrections during the Production stage until the Subject Matter Expert signs off on the product. The learner evaluation involves either one to one evaluation, or small group evaluation. The use of computer programs, immersive technology, graphics, animated sequences, or video make altering the courses at the final stage very expensive and time-consuming (Seels & Glasgow, 1997). To overcome this problem, the learners evaluate the first instructional prototype. In the one to one evaluations, students individually go through the prototype in front of the designer, and the designer takes note of each student's comments. The designer studies the notes and makes the necessary revisions after students review the instruction. In small group evaluation, a group of users will go through the instruction, and the material is presented as it would be in the true learning environment. There is little intervention during the instruction, and a questionnaire is given to the users at the end of instruction.

Before the content unit can actually be released, the faculty member reviews the final product one additional time to make sure that it is an appropriate teaching tool. When the Subject Matter Expert accepts the product, then development moves forward to the next content unit and the process repeats until all content units are complete.

Post-Production

At the beginning of the Post-Production phase, all content units should be completely developed and approved by the Subject Matter Expert. At this point, field-testing is conducted which involves the actual use of the Web site to facilitate the course in a distance setting. The purpose of this field test is to discover areas that need some additional consideration to ensure that the instruction is as effective as possible for the largest number of students over the long term. The students should be asked to provide comments and feedback to help improve the course throughout this semester

Although training is provided throughout this process, a debriefing session is held at the end of the third semester to answer any questions in order to ensure that the faculty member is ready to maintain the course independently. During these three semesters, all pertinent Web technologies are introduced and demonstrated.

Additionally, basic instruction is provided to help the Subject Matter Expert learn to create and maintain Web pages independently.

Testing and ongoing adaptation testing, which are used to evaluate the merit of a completed Web course begin with simple Likert-type survey questions. The questions examine user perceptions and experiences regarding the various elements of course. The areas of interest that are most important to examine include navigation, graphics or visual appeal, and validity or comprehension of the content. A survey is administered during the field test at the completion of the Web course. The surveys are collected and analyzed for any significant input that impacts the design of the course. If user feedback suggests the need for significant improvement to the site, changes are implemented and noted. During every semester, developers and designers receive new and regular input about each course being offered through the Web. Changes are completed as necessary and the change process begins again to facilitate ongoing data collection and analysis of the Web courses.

When the final product has been delivered with all changes and corrections, and the Subject Matter Expert is ready to maintain the site, the process is complete. The Subject Matter Expert member signs-off on the project, and the full offering of the course begins.

Conclusion

As the number of classes offered over the Internet continues to increase, it is important for educational institutions to develop and maintain effective procedures for course design and development. One way to facilitate this process is to create a division within the university whose sole purpose is to guide, instruct, and assist faculty members as they make this transition. A program such as the one described in this paper ensures through a systematic process that the courses developed for this medium will be effective and produce high quality results.

References

Berg, G. A. (1999). Community in distance learning through virtual teams. *WebNet Journal, 1*(2), 33-39.

Berge, Z. L. (1995). Facilitating computer conferencing: Recommendations from the field. *Educational Technology, 35*(1), 22-30.

Bonk, J. C., & Cummings, J. A. (1998). A dozen recommendations for placing the student at the center of web-based learning. *Educational Media International, 35*(2), 82-89.

Bonk, J. C., & Cunningham, D. J. (1998). Searching for learner-centered, constructivist, and sociocultural components of collaborative educational tools. In C. J. Bonk & K. S. King (Eds.), *Electronic Collaborators: Learning Centered Technologies for Literacy, Apprenticeship, and Discourse,* (pp. 25-50). Mahwah, NJ: Lawrence Erlbaum Associates.

Dabbagh, N., & Schmitt, J. (1999). Pedagogical implications of redesigning instruction for web-based delivery. *Educational Media International, 35*(2).

Dick, W., & Carey L. (1996). *The systematic design of instruction* (4th ed.). New York: Harper Collins College Publishers.

Lebow, D. (1993). Constructivist value for instructional systems design: Five principles toward a new mindset. *Educational Technology,Research and Development, 41*(3), 4-16.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for the online classroom.* San Francisco, CA: Jossey-Bass Publishers.

Seels, B., & Glasgow, Z. (1997). *Making instructional design decisions*. Upper Saddle River, NJ: Prentice-Hall.

Acknowledgements

The authors of this paper wish to recognize our fellow team members who have contributed to the development of this process: Cynthia Lopez, Anne Henry, Gary Kidney, Lee Anne Kortus, Kristi Fairbanks, Bernadette Manning, Kathryn Kelly, Sarah Muir, and Gus Chang.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

REPRODUCTION BASIS

☒ This document is covered by a signed "Reproduction Release (Blanket) form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

☐ This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").