Faculty Technology Training: Learning Objects

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Abstract
Promotion of the development and use of learning objects assists the ongoing evolution of modern instructional technologies and enrich the efforts and opportunities of distance education theory and research. In order to identify successful training strategies, faculty were recruited from southern California community colleges to receive training in the development and use of online learning materials called learning objects. A learning object is small, single concept, reusable, instructional content that is typically delivered using digital multimedia.

Background and Problem
Faculty members need training and support in order to teach effectively with technology (Fuller, 2000). They need to know more than merely the technical and administrative aspects of using technology. Faculty training and support must address how technology may be used to enhance student learning and performance; simply introducing software and other technological tools to faculty will not ensure that they are able to use them effectively to help their students learn (McKenzie, 2000). Inadequate faculty expertise in educational technology presents a challenge to building quality distance education programs at community colleges. Faculty need training that provides them with the skills to develop and use pedagogically sound learning materials appropriate for online instruction. Training in learning objects addresses the challenges many online faculty face when converting from face-to-face instruction to online instruction. Instructional materials should be developed as discrete learning objects to serve the needs of faculty members creating online courses. Learning objects are interactive instructional materials or small multimedia or digital modules that can be re-used to support a specific learning objective. Faculty teaching distance education courses need to be able to access instructional materials that teach the specific concepts they have set as objectives for their course (Bratina, Hayes, & Blumsack, 2002; Carnevale, 2001). Instructional resources available on the internet abound. However, many materials are designed at course or unit level, rather than the learning object level and hence lack reusability (Longmire, 2000).

To address this need, the California Virtual Campus Region 3 (http://www.cvc3.org/) funded the Learning About Learning Objects Project to train faculty in the development and use of learning objects. During 2003, community college faculty in southern California received instruction on the development of learning objects through their participation in the project. The project was developed and implemented by the San Diego Community College District. The Board of Governors of the California Community Colleges and the Chancellor selected the project to receive the 2002-03 Technology Focus Award.

Learning Object Definitions
The project used the following definition for learning objects: A learning object is instructional content that is small, reusable, self-contained, durable in multiple contexts, and multimedia or digital modules. It usually involves interactivity and assessment, supports a single learning objective and can be grouped with other learning objects. A learning object is content that can be used to help teach a particular concept (Jacobson, 2002; Longmire, 2000). Interactive elements and/or graphical elements used for

learning objects include graphics, navigation schemes, assessments, collaboration tools, games, simulations, problem-solving, case studies, webquests, electronic calculators, animations, tutorials, websites, bibliographies, audio and video clips, photographs, illustrations, diagrams, graphs, maps, and charts (also see Mayer, 2001). One example of learning objects (see AliveTek website http://www.alivetek.com) is a 60 second animated streaming video that explains the difference between social conformity and compliance by asking viewers to engage in specific timed tasks. This learning object could be used in a variety of courses that require students to understand the meaning of social conformity or compliance behavior.

Project Significance
The project goal was to create a model of learning object training, design, and identification for use throughout the educational community. In order for a learning object to be truly reusable, instructors must be able to place it into the context of another learning objective or lesson in meaningful ways (Wiley, 2000). Project staff encouraged participants to apply the systematic instructional design process and transactional distance concept as they conceived and developed their learning objects.

Project Design and Implementation
The project was implemented in several stages: Participant application and selection process; launch of training website; orientation session; completion of lesson plan; completion of Learning Object Development Form, ongoing staff support; completion of learning objects by participants. Participants were given deadlines for completion of tasks through-out the Project duration. Three face-to-face meetings were conducted: Orientation Session; Drop-in Follow-up Training Session; Showcase Presentation of Completed Learning Objects. The Learning Object Development Form has two purposes: 1) To provide a framework for the construction of a learning object based on instructional design theory; and 2) To provide descriptive information for the benefit of users and learners interested in the use and/or placement of a learning object into their own educational and/or instructional goals. The project website suggested the use of a number of different web design, evaluation, and accessibility tools that would be useful to faculty during development of their learning objects. Recommendations included: Camtasia Studio, Macromedia Tools, Microsoft Frontpage, Adobe GoLive, Yahoo Geocities, Evrsoft, Quia, Zoomerang, National Center for Accessible Media, Web Accessibility Initiative, and Bobby.

Project Participation Application and Selection Process
In fall 2002, project staff sent announcements of a training opportunity to community faculty in southern California via on various websites and newsletters. In order to be eligible, participants had to be employed by a CVC Region 3 community college. In return for the training in the development of interactive instructional materials, a $200 stipend, and multimedia development software, participants were obligated to: 1) attend at least one orientation meeting and/or training appointment; 2) develop at least one learning object that will be copyright free and open to distribution on a public server including the SDCCD Learning Object Database, the MERLOT repository, and/or CVC3 server; 3) follow Section 508 accessibility guidelines in the development of the learning objects; 4) mentor at least one other faculty member in the development and/or use of learning objects by the end of 2003.

Project participation required submission of an online application. Of the 57 applicants, 25 were selected to participate in the project. Selection was primarily based on an attempt to assemble a group of educators who represented as many community colleges in the region and academic disciplines as possible. Among multiple applicants from the same college and/or discipline, the applicant with the most clearly articulated learning object topic was selected. As part of the screening process, each applicant responded to the following statements in the online application: 1) Do you agree that the learning object you develop as part of this training will be copyright free and open to public distribution? 2) Are you willing to mentor at least one other faculty member in the development and/or use of learning objects by the end of 2003? 3) Are you willing to follow

accessibility guidelines in the development of your learning object? Only applicants who responded "Yes" to the preceding questions were considered for selection. In addition, each applicant responded to the question: "How comfortable are you with using computers for developing instructional materials?" The average score among all applicants was 3.26 on a scale of 1 to 4 (low to high) for the question. This question was not used as a selection factor. The 25 faculty selected for participation represented the following community colleges in southern California: Cerritos, Coastline, Cuyamaca, Fullerton, Golden West, Grossmont, Mira Costa, Orange, Palomar, Saddleback, San Diego Centers for Education and Technology, San Diego City, San Diego Mesa, San Diego Miramar, and Santa Anna. The selected faculty were contacted and invited to a face-to-face Orientation Session and to view the project website.

Project Website Content
Prior to attendance at the Orientation Session, participants were encouraged to study all the information at the website set up for this project: Project Overview, Lesson Design, Use of the Content Performance Matrix, Learning Object Development Form, Homework Assignments, and Content Evaluation. The website can be viewed at www.learning-objects.net.

Lesson Design
The development of learning objects through digital media requires a structured lesson plan in order to insure that the object is complete and able to convey a learning objective. Faculty were provided the following outline describing the necessary elements of a lesson plan. Four main elements were identified as necessary components of a structured lesson plan: Introduction, Background Information, Target Lesson, and Summary. The introduction to the lesson should help to orient the learner as well as motivate them (relevancy to needs, and /or benefit of information knowledge). The learning objective should be located in the introduction as well. The instructors should determine the performance-based outcomes the students will be required to complete depending upon the content of their lesson. The introduction should contain the following elements: Purpose of Learning Object, Benefits of Learning Object, Importance of Learning Object, Context Objective, and Outline of Lesson. Background information should be given to the learner to provide relevance and context of the lesson to be learned. This includes: Technical terms, needed facts, and connection between the background information, practice elements and target objective. The target lesson reflects the learning objective to be achieved. The core of the target lesson should include: Informational displays describing what is to be learned and practice opportunities for mastery. The lesson summary provides condensed reiteration of key points and reminder of lesson objective.

Faculty used the Content Performance Matrix in order to assist in the development of general user interface as well as evaluation design (Merrill, 1983). The Content Performance Matrix establishes that information can be classified as fact, concept, process, procedure, or principle and is engaged by the learner at either a memory or application level (Clark, 1989). Performance outcomes should be written within the learning objective and should mimic the actual situations that learners will encounter. Each cell in the matrix describes a different instructional approach depending upon the class of information being taught and the targeted performance level. The importance of the content performance matrix in learning object development is to identify the cognitive domain in which a learning object's content is being taught. Doing so it assists instructional designers in successfully sequencing groups of learning objects into cohesive and coherent lessons.

Orientation Session
At the three-hour Orientation Session, conducted in February 2003, attendees networked with project staff and other participants, engaged in a Concept Mapping Exercise, and reviewed the Steps for Project Completion. The Orientation Session was designed to inform participants about their role and obligations in the project, review the Learning Object website, pick up Camtasia software, and explore the resources available to help them. Of the 25 faculty selected to participate in the project, 14 attended the face-to-face Orientation Session. The Concept Mapping Exercise was designed to assist learners generate graphical representations of their perceptions about learning objects and communicate those perceptions with others. The exercise involves

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three steps: Generation, Structuring, and Representation. First, learners wrote statements (or terms) that have to do with learning objects on sticky notes. They used one sticky note for each statement, concept or term. Next, they sorted the concepts into piles. They could have as few or as many piles as they desired. Then, they were asked to name each pile with a short descriptive label and write the pile name on a sticky note (see Robertson, 2003).

Finally, the learner created a diagram using the sticky notes with lines and arrows to show how the concepts are related to each other. Concept mapping is a technique that builds on the card sort technique and has been used for program planning and evaluation as well as training since the 1980s (Trochim, 1989). The result is similar to an affinity diagram which serves to clarify complex issues and gain group consensus (Chang & Niedzwiecki, 1993). Participants explained their concept maps with each other. As a result of participation in the card-sort and concept mapping exercise, participants put their understanding of learning objects into context and communicated their grasp of the learning object concept to staff. Consequently, project staff quickly identified any misunderstandings or confusion by specific participants and made appropriate clarifications.

Next, staff reviewed attendees' lesson plan drafts and provided feedback. Fourteen attendees completed a 25 item Orientation Session Feedback survey. Most suggested that a greater percentage of time should be spent on demonstration rather than hands-on training during an Orientation session. Most suggested 3 – 4 hours as the optimal amount of time for an Orientation session. A majority of respondents indicated "Strongly Agree" to "Overall, I think that the Orientation session was useful to me" (93%), "I found it helpful to get the Orientation in-person rather than as an online tutorial" (79%) "The amount of information provided about learning objects was appropriate" (57%), and "After attending the Orientation, I believe that I will be able to use learning objects successfully" (57%). A majority agreed that "The length of the Orientation session as appropriate" 86%, "The printed materials are useful" (78%), and "The type of information provided about learning objects was appropriate" (86%).

Project Outcome

By the end of the project, 10 of the 25 selected participants completed their learning objects, 11 were still in the process of completing their learning objects, and 4 dropped out. No significant difference (p<.05) between project participants and drop-outs was found for their level of comfort with using computers for developing instructional materials as self-reported during the application process. The average score among participants was 3.38 and among drop-outs was 3.75. Follow up inquiries by a project staff member determined that unanticipated changes in job and family responsibilities prevented some participants from finding enough time to complete.

Seven months after the beginning of their participation in the project, eight participants met to present their completed learning objects. Seven of the eight attendees completed a Learning Object Training Project Feedback Survey. A majority of respondents (86%) indicated that they "Strongly Agree" with the following statements: Overall, I think that the project was useful to me; I found it helpful to meet in-person; The information provided is useful; After participating in the project, I believe that I will be able to use learning objects successfully; After participating in the project, I am confident that I know how to develop learning objects. Many respondents (71%) indicated that they "Strongly Agree" with the following statements: I found the Learning Objects website to be helpful; The amount of information provided is useful; The type of information provided about learning objects was appropriate. Less than half (43%) indicated that they "Strongly Agree" that the length of the project was appropriate. Each of the completed learning objects was posted to the project website repository (http://www.learning-objects.net/) now available to the general public. The learning objects address the following topics: Emotion & Fallacy, Time Management, Grammar

Terminology, Creating Portfolios, Information Competency, Building a Computer, Faculty Development, Ethics, and Preparation for an Online Course in Engineering.

Recommendations

Based on the experience of implementing the project, staff recommend separating future faculty training in learning objects into two distinct sessions and greater monitoring of participant progress. The first session would deal with theory and concepts with emphasis on the relationship between a good lesson plan and a successful learning object. Project staff observed that many participants let the technology dictate the outcome of the learning-object rather than using the technology as a tool. The second session would focus on learning object development. More emphasis should be placed on the use of low threshold applications that allow delivery to low-end users and minimize distraction from content. Instead, offer faculty the choice of several learning object templates that deliver materials using a continuum of low to high end technology. This would allow faculty developers to concentrate their time and effort on content rather than on learning new software or technology techniques. More frequent interaction with project participants by staff may have resulted in a greater number of participants completing their learning objects. By monitoring the participants' levels of engagement and commitment more closely, staff would better know when to intercede.

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