Guidelines and Standards for the Development of Fully Online Learning Objects

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Abstract

The transition from face to face learning to the delivery of instruction through re-usable online learning objects has been shown by Salas and Ellis (2006) to be not only effective but have benefits to students, instructors, and administrators. Course websites are learning objects that when used in conjunction with sound pedagogy, learning outcomes, and content can support traditional, authentic, and alternative learning and assessment protocols (Bennett, 2002). The adoption of standards and guidelines for the design and evaluation of learning objects is an important means of quality assurance (Friesen, 2005; Krauss & Ally, 2005; Valarmis & Apostolakis, 2006) that supports the communication of meaningful feedback to instructional designers for product improvement (Krauss & Ally, 2005). In order to ensure that learning objects that support fully online instruction are well developed, a set of standards has been developed by the Office of Instructional Technology at the University of Maryland Eastern Shore that are supported by an evaluation rubric. The goal of this paper is to encourage the establishment of guidelines and a method for evaluating e-learning quality by providing a model that can be adapted and adopted by interested institutions.

Keywords: Online Learning Objects, elearning, standards for online course development

Introduction

A learning object has been defined by Cohen and Nycz (2006) as a knowledge based object that is self-contained and reusable. Gallenson, Heins, and Heins (2002) refer to learning objects as a unit of instructional content that facilitates content mastery and links to learning outcomes.

Salas and Ellis (2006) explain that learning objects frequently include a variety of multimedia learning materials. According to Nash (2005) the effectiveness of learning objects is based on function, flexibility, and ability to satisfy learning objectives and adds that before a learning object is developed measurable learner outcomes, student levels, and content range must be established.

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Online courses and online course components can serve as powerful learning objects and according to Nash (2005) course management systems such as BlackBoard and WebCT may be considered meta-learning objects.

Well developed and instructionally sound course websites have proved to be effective at delivering instruction and linking to student outcomes as-

sessment in a format that can be reused and refined over time (Buzzetto-More, 2006). Course websites as learning objects that are influenced by sound pedagogy, learning outcomes, and content can support traditional, authentic, and alternative learning and assessment protocols (Bennett, 2002).

E-Learning may be web-assisted, classroom learning that is facilitated by the use of a course website and the World Wide Web; a mixture of classroom and online instruction known as the hybrid or adjunct model; or a fully online experience, where all instruction and assessment occurs electronically (Buzzetto-More and Sweat-Guy, 2006).

Nash (2005) links learning objects to constructivist educational philosophy and Koohang and Harman (2005) assert that online learning by its very nature is rooted in constructivist ideology, where knowledge acquisition is an inquiry-oriented self-directed activity that is authentic and encourages knowledge construction.

Since learning objects are self contained units of instructional content in e-learning they may be found as units of study located on a course website that a used either in a web-assisted or a hybrid course. A web-assisted course that is a fully classroom orientated course with a course website used to deliver learning materials, facilitate communications, and/or provide links to resources. The hybrid model blends face-to-face interaction with online learning (Buzzetto-More & Sweat-Guy, 2006). A course website in its entirety can become an effective learning object when it is part of e-learning which has been defined by Koohang and Harmon (2005) as learning experiences delivered electronically that include all learning materials and activities relating to instruction.

According to Cohen and Nycz (2006) e-learning has economic and social benefits to society. Additional benefits of learning through learning objects are:

- The implementation of active learning strategies (Parish, 2004)
- Solutions for individualizing instruction (Nash, 2005)
- Replicability and accessibility (Nash, 2005)
- Ease of learning management.

A number of instructional technologist support the standardization of learning objects as a means of quality assurance (Friesen, 2005; Krauss & Ally, 2005; Valarmis & Apostolakis, 2006). Valarmis and Apostolakis (2006) explain that reusability and interoperability of content and technology is crucial to the standardization of learning objects for quality assurance. They advocate the adoption of a set of global standards for e-learning technologies that impact the entire lifecycle of a learning object.

Krauss and Ally (2005) conducted a study that looked at how learning theories and understanding of human cognition impact the development of learning objects and then experimented with an instrument for assessing the quality of a learning object. They used an eight criteria that was distributed as Likert scale survey questions to both teachers and students following their use of a specific learning object. The eight points included: content quality, learning goal alignment, feedback and adaptation, ability to motivate learning, presentation design, usability, reusability, and supporting resources. As a result of their work, they made two recommendations: 1) that more effort should be spent on the identifying and sharing of best practices for designing and applying learning objects to instruction and less time spent on the content itself; and 2) that evaluation of learning objects become a more commonplace practice.

Friesen (2005) examined the e-learning standards established by the IMS Global Consortium, the IEEE LTSC (Institute of Electrical and Electronics Engineers, Inc. Learning Technology Standards Committee), and the ISO/IEC (International Standards Organization/International Electro-

technical Commission) and noted that they primarily relate to issues of metadata and infrastructure rather than pedagogy. He explained that the difficulty in establishing standards for e-learning is that the technology is consistently evolving.

The popular *Seven Principles of Effective Teaching: A Practical Lens for Evaluating Online Courses* written by Graham, Cagiltay, Byung-Ro, Craner, and Duffy (2001) has guided the development of many e-learning evaluation programs. It focuses completely on teaching effectiveness rather than usability or design. The seven principles include: student-faculty interaction that is encouraged and guided, discussions and assignments that encourage student cooperation, active project-based learning, providing of prompt feedback, use of deadlines, establishment and communication of expectations, and the acknowledgement of diverse learning styles.

One of the purposes of assessing a learning object is to provide relevant feedback to instructional designers that can be used to improve the quality and usability of the end product (Krauss & Ally, 2005). This paper presents one model for assessing the learning object effectiveness from pedagogical, design, usability, and reusability standpoints.

Founded in 1886, the University of Maryland Eastern Shore (UMES) is a historically black, 1890 land grant institution and a member of the thirteen-campus University System of the State of Maryland. The student body is approximately 3,700, with 10% of the enrollment representing graduate students. UMES is located in a rural region and is the most affordable four-year institution of higher education in the state.

In a move to stimulate the use of alternative delivery methods, the regents of the University System of Maryland instituted a policy in 2005 recommending that all students take on average 12 credits through out-of-classroom experiences and other nontraditional means. Included in the regents' definition of out-of-classroom experiences are e-learning, internships, student teaching, and a host of other activities. Diana G. Oblinger, vice president of EduCause, was cited in Lorenzetti (2005) as saying that the Maryland system is recognizing that some online learning is an enhancement to students' higher-education learning experiences even when those students are full-time on-campus residents.

WebCT has been adopted as the course management system of choice by the University System of Maryland. UMES began integrating WebCT into their curriculum in 2001. An Office of Instructional Technology was established as a result of the receipt of grant funding to support e-learning development and delivery.

In order to assure that fully-online course websites are high-quality learning objects, and after a disappointing review of existing online course showed tremendous variations in quality, the UMES Office of Instructional Technology (OIT) developed a set of guidelines and requirements as well as a rubric (see Table 1) used to evaluate completed courses. The standards were developed by a small committee comprised of instructional technologists and teaching faculty who conducted an exhaustive review of the literature on e-learning effectiveness as well as several models for online course evaluation including but not limited to: Evalutech, MacEwan, National Education Association Guidelines, the Digital Campus model, the University of Texas Model, WebCT's Model, and the model adopted by the University of Maryland College Park. Almost all models reviewed used a rubric as part of their evaluation process. After much discussion a rubric was selected and modified.

The University has decided that all online courses must be approved as satisfactory by the OIT and be considered the property of the university to be shared within the institution. All instructors developing fully-online courses are required to meet with one or more instructional technologists representing the OIT for assistance with learning object development. The courses are evaluated

twice using the rubric in Table 1, once prior to instruction and again following the courses first offering.

Table 1: UMES Online Course Learning Object Evaluation Rubric

	3	2	1	0
1. Prerequisites	Prerequisites are clearly listed in multiple areas and well explained.	Prerequisites are clearly listed.	Prerequisite are incomplete, hard to access, or poorly organized.	No prerequisites listed at this time.
2. Technology requirements	Technology requirements are listed and well explained.	Requirements listed.	Requirements are incomplete.	No requirements are listed at this time.
3. Objectives and outcomes.	Objectives and outcomes are given and written in such a way that they are clear and measurable.	Listed but may not be clear and/or measurable.	Vague and are not consistent.	None exist at this time.
4. Activities support learning.	All activities are related to student outcomes and objectives	Activities appear to support achievement.	Activities do no appear to be related to goals and/or outcomes.	No activities listed at this time.
5. Assessment	Assessment of student progress is given throughout the course measures progress towards objectives and outcomes.	Assessment measures student progress towards objectives and outcomes.	Assessment does not measure progress.	No assessment addressed at this time.
6. A variety of tools enhance interaction.	Sustained interaction is facilitated by the use of communication tools.	Interaction is facilitated by the use of communication tools.	Little interaction is facilitated by the use of communication tools.	No interaction is defined at this time.
7. Course materials.	Materials are easily to locate, accessible, understandable, meaningful, organized logically, and developed to enhance student achievement.	Most materials are easily located, accessible, understandable, meaningful, organized logically, and developed to enhance student achievement; however, some require improvement.	Materials are either difficult to locate, require too many technical steps, hard to understand, not meaningful, poorly organized, and or irrelevant.	No materials have been included at this time.
8. Student support.	Instructor uses communication tolls to provide students with readily available and timely support that helps keeps students on target.	Instructor uses communication tolls to interact with students and provide support.	Instructor sometimes communicates with students directly.	Instructor does not communicate with students directly, meaningfully, and/or in a timely manner.
9. Frequent and timely feedback.	Instructor provides frequent and timely feedback.	Instructor provides feedback.	Instructor sometimes provides feedback.	No feedback is provided.
10. Appropriate pacing.	All learning and activities are paced in a way that is meaningful and facilitates learning mastery. Calendar tool used.	Instructor paces most activities and the schedule is listed on the syllabus.	Some activities are paced.	No evidence of pacing exists at this time.

11. Expectations for student discussion/chat participation.	Expectations for student discussion/chat participation are well developed, consistent, and communicated clearly to students.	Participation expectations are communicated to students.	Expectations are vague and/or unclear.	No expectations exist at this time.
12. Grading	Grading is timely, accessible by students, and secure.	Grades are accessible to students and secure.	Grades are inconsistently made available to students and/or are not secure.	Grades not available to students.
13. Course content	Course content is clear, meaningful, plentiful, accessible, and supported by the instructor.	Course content is for the most part clear, meaningful, accessible, and supported by the instructor.	Course content is not always meaningful, clear, and/ or accessible.	Course content is weak and lacking.
14. Navigation	Navigation is clear, logical, and all buttons/links work.	Navigation is mostly clear and most buttons/links work.	Problems with navigation exist that may cause student difficulties.	Navigation may cause confusion.
15. Display	Color, buttons, images, graphics, and etcetera enhance the course.	Some display elements are distracting and/or slow to open.	Elements may be unrelated, distracting, and/or unnecessary.	Elements are weak, distracting, burdensome, unprofessional, inappropriate, and or sloppy.
16. Multimedia (if appropriate)	Multimedia used is appropriate, enhances learning, accessible, professionally created, linked to course content, available in an alternative text based format, and work.	Multimedia used is appropriate, enhances learning, professionally created, but may not be linked to course content, available in an alternative format, work properly, and/or accessible.	Multimedia used may be unnecessary, not linked to content, difficult to access, and or problematic.	Multimedia is unprofessional, distracting, and/or burdensome.
17. Time Devoted	The instructor devotes the appropriate amount of time to the development of the course, timely support of student learning, and sustaining of learning. Online office hours are provided.	The instructor devotes the appropriate amount of time to the development of the course, support of student learning, and sustaining of learning.	The instructor must devote more time to this course.	Not enough time has been spent and/is allocated for this course.
18. Reusability	This course will be easy to reuse, simple to modify/ improve, serve a large potential audience, and have longevity.	This course can be reused and modified easily.	This course will serve a limited audience, require tremendous modifications, be difficult to reuse or modify, and/or may not have longevity.	This course will be almost impossible to reuse.
Results	**This course is fully endorsed and the instructor is commended for their hard work.**	**This course is approved with modifications.**	**This course requires major reworking.**	**This course is sub par.**

UMES E-Learning Standards

Objectives and Student Learning Outcomes

The instructor must establish objectives and student learning outcomes that reflect not just the content of the course but also the e-learning mode of instruction (Buzzetto-More & Alade, 2006). They must be communicated in a manner that that is clear and measurable. These must be identified in advance of creating the course and must be communicated directly to learners. To help assist faculty in the development of student learning outcomes it is recommended that Bloom's Taxonomy of Educational Objectives is used to help guide the phrasing which provides a recognized set of hierarchical behaviors that can be measured as part of an assessment plan (Harich, Fraser, & Norby, 2005). The six levels of Bloom's Taxonomy relate to cognitive growth and in ascending order include: knowledge, comprehension, application, analysis, synthesis, and evaluation (Buzzetto-More, 2006).

Instructional Activities

All instructional activities should be designed to reflect the subject matter as well as the benefits derived through e-learning (e.g. project based learning, authentic instruction, Webquests, and etcetera) (Buzzetto-More, 2006). All activities should be purposeful and thoughtfully designed to assist students in achieving the instructional objectives. They must also be scaffolded, organized, and paced meaningfully throughout the semester (Digital Campus, 2002).

Assessment

Haken (2006) explained that assessment is an integral piece to assuring that an educational institution achieves its learning goals, as well as a crucial means of providing the essential evidence necessary for seeking and maintaining accreditation. Hersh (2004) advocated the position that assessment of student learning should be considered an integral part of the teaching and learning processes as well as part of the feedback loops that serves to enhance institutional effectiveness. Ridgway, McCusker, and Pead (2004) define e-assessment as the use of electronic technologies to drive student learning assessment. Vedlinski and Stevens (2002) illustrate that technology provides new means to assess learning that will yield rich sources of data. According to Buzzetto-More (2006) the implications and benefits of e-learning on assessment are numerous and e-learning should be used to help drive effective assessment programs.

Interaction/Communication & Feedback

Interaction and feedback in online learning environments is essential to success. It is important that the instructor plan for, develop activities that support, and facilitate interaction. The ability to engage in critical discourse through e-learning endeavors has been shown to benefit the learning process (Sweat-Guy, in press). Studies by Garrison, Anderson, and Archer (2004) found that online discourse fosters critical thinking and reflection, and Wu and Hiltz (2004) explained that asynchronous communications improved students' perception of learning. Successful online discussions can allow students to demonstrate not just content mastery but the ability to incorporate content into higher level thinking; as a result, transcripts from electronic discussions have shown themselves to be valuable assessment artifacts (Buzzetto-More, 2006).

The use of communication tools should be thoughtful and educationally relevant. The instructor must be an *active participant* in online chats and/or discussions and performance expectations must be articulated to students (Sweat-Guy, in press). The Office of Instructional Technology has developed a rubric which can be adopted by UMES faculty for assessing student discussion/chat performance.

The instructor must be readily accessible to students and provide timely and meaningful feedback to students. It is important that expectations are established and the type of feedback a student will received must be communicated to students in advance (Digital Campus, 2002). Student grades must be made available to students individually, privately, and in a timely fashion using the supplied online grading tools.

Instructional Materials

All materials delivered must enhance learning and support learning goals and should never distract and/or detract from the learning process nor place unnecessary stress or burden on students (Digital Campus, 2002). Materials must be purposeful, accessible, include instructions, logically organized, and available to students with slow internet connections.

Layout/Interface Design

The interface must be clear, professional, *simple*, appropriate, and planned in such a way to facilitate learning (Digital Campus, 2002). The layout must be logical and navigable and not confuse the learner.

Multimedia Usage

Multimedia elements can greatly enhance the learning experience for students of varying learning styles; however, when ill planned and/or developed they can be a tremendous distraction and/or place a burden on the students (Digital Campus, 2002). As a result, they must be meaningful and accessible to students.

Course Management

Course management is a vital to the elearning equation. Instructors **can not** be absent from their online course and must manage all aspects of learning (Sweat-Guy, in press). Online courses take time to develop and can be more time consuming initially then their in-person counterparts. Once created; however, the course can be re-used from semester to semester and placed in a learning object repository where it is shared across the larger academic community (Salas & Ellis, 2006). The instructor should also plan on offering online office hours as well as checking the course website on a daily or near daily basis.

Evaluation Rubric

Rubrics articulate the standards by which a product, performance, or outcome will be evaluated (Aurbach, n.d.). They help to standardize assessment, provide useful data, and articulate goals and objectives (Buzzetto-More & Alade, 2006).

A rubric has been designed and implemented for e-learning evaluation (see Table 1). Its initial incarnation was heavily influenced by the work of Dawn Truelson and Michelle Fisher at the Digital Campus (2002) of California State University in Fresno California. Over time; however, this rubric has been significantly modified to fit the goal of creating fully online learning experiences that serve as meaningful learning objects.

Currently at UMES, all fully online courses require approval by the Office of Instructional Technology. Following a series of discussions a minimum score was established. The minimum standard/score for endorsement by Office of Instructional Technology has been designated as 42 out of a possible 51 points.

Results

Prior to the adoption of the standards and guidelines and the accompanying rubric, existing online courses were evaluated by a team comprised of one faculty member and one instructional technologist from the Office of Instructional Technology. The review found that approximately 50% of the existing online courses met the new standards for acceptability. Faculty were not informed of the results of the evaluation; however, all faculty were notified that they would now be required to submit an online course request and offer their course up for a rigorous review. A copy of the rubric as well as a document explaining the standards and guidelines was distributed to all faculty.

Fortunately, these activities coincided with the move from the WebCT 4 to the WebCT 6 LMS which required all faculty to modify their courses to fit the significantly changed LMS as well as the new standards. To assist this process, training and one-on-one consultations were, and continues to be offered, in the new LMS and standards and a newsgroup was formed for the online teaching faculty. As an incentive, a mini-grant was established that awards six faculty per semester $2,000 for the creation of courses that met the new standards.

An informal questioning of the faculty who frequently teach online indicated that the standards and guidelines increased their knowledge of e-learning as well as provided meaningful feedback. The result has been an overall increase in the quality of the online course offering at UMES with all courses now meeting or exceeding the standards for acceptability.

Conclusion

Well developed learning objects should be pedagogically sound, well presented, thoughtfully managed and supported, usable, and reusable. Establishing standards and guidelines for the design and evaluation of learning objects is a valuable means of insuring quality (Friesen, 2005; Krauss & Ally, 2005; Valarmis & Apostolakis, 2006). Assessment of learning objects provides meaningful feedback to instructional designers that can be used to improve the quality and usability of the end product (Krauss & Ally, 2005). This paper presented a working model for assessing e-learning quality that can be adopted by other academic institutions with the goal that the standardization and evaluation of learning objects becomes a more widespread practice.

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Biographies

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Kaye Pinhey was a primary collaborator on the development of the standards and guidelines. Most importantly, he was the individual responsible for the implementation of the model developed. Mr. Pinhey is the Director of the Office of Instructional Technology at the University of Maryland Eastern Shore. He holds a B.S. degree from Miami University of Ohio, an M.A. from the University of Florida, as well as certifications from Novell and Microsoft. His areas of interest include quality assurance in e-learning, instructional video, multimedia development, and synchronous online instruction.