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ABSTRACT

This paper discusses instructional design considerations related to learner assessment in multimedia instruction. Topics addressed include: current practice in learner assessment; planning and presenting instructional objectives; objectives' role in learner orientation; objectives and "Just-in-Time" learning; feedback to the learner during instruction; learner assessment via computer-scored testing; online course assessment methods; portfolio and project instructor-based learning assessment; and durability of final assessment. Contains 17 references. (MES)

# Learner Assessment in Multimedia Instruction: Considerations for the Instructional Designer

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## Become Aware of Current Practice in Learner Assessment

The designer of instructional multimedia needs to be aware of currently accepted practices to stay appraised of the array of methods and applications from which he or she will want to choose and also to be aware of practices that appear to be expected, appropriate, and functional. Most experts agree that several measures and methods should be used to determine course effectiveness.

Current computer-based instruction (CBI) and Web-based instruction (WBI) assessment practices include a variety of methods such as instructors evaluations of students, students' self assessments, peer to peer assessments, exams, project based assessment, and assessments that are tied into log-in and usage data. Bergman and Moore (1990) suggest three questions that designers should answer about the evaluation process: Is the evaluation voluntary or required? How much user activity is being assessed? What type of feedback is provided? Bergman and Moore believe that voluntary self-assessment "is a sound strategy for adults" (p. 63). However, they also list three more traditional categories, common in assessment, that they feel are appropriately used for specific circumstances: single items -- to test knowledge of single concepts; grouped items -- for assessing knowledge of "logical units" (i.e., on chunked material); and multiple groups of items -- for a final test. Nicholas Iuppa (1998) makes a useful distinction between test styles, specifically concept tests and simulation tests. Concept tests are used to assess learners' understanding, while simulations test learners' performance. In discussing how to assess concept and performance via digital media, Iuppa cautions that digital assessment has its limits. He says, for instance, that tactile skills are "among the very few" types of skills that digital media cannot assess and points out digital media cannot, for example, test how smoothly the student manages to screw in a spark plug, which is an important part of the process.

Current evaluation procedures range from "one shot grading, " such as taking a final or semester test, to mastery or "perfection-based" grading, which allows students to redo assignments, within an acceptable time frame, until they are perfected (Cox, 1999). Counter to traditional design theory is the growing need to specify instructional goals and learning outcomes to accept what is termed as a "diversity of outcomes." Duchastel explains that this can best be achieved by, "aligning evaluation not with knowledge, but with task accomplishment that utilizes knowledge" (1997, p. 225).

## Planning and Presenting Instructional Objectives

The most critical issues for instructional designer are those regarding how best to plan, present, and evaluate objectives and outcomes for CBI/WBI instructional materials. Bannan and Milheim (1997) describe the issue in this manner:

> The World Wide Web is becoming a major source for educational material delivered to learners who prefer (or are required) to learn apart from a traditional classroom. While the educational

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potential of this medium is just beginning to be realized, its utilization will certainly increase over time as larger numbers of educators and learners see the significant value in this type of instruction. However, while there is tremendous potential for this type of learning, there is also a significant need to describe these Web-based courses in terms of their overall instructional design characteristics, rather than defining each course only by the specific content it provides. Without this organizational process, courses will be perceived and categorized based primarily on their subject material, rather than the instructional strategies and tactics used for the delivery of the educational material (p. 381)."

These issues are also concerns of the designer of instructional programs delivered by means of CD-ROMs or other computerized stand-alone tutorial materials. In traditional instructional design, objectives are the critical, conceptual foundation on which the instructional designer constructs the framework of the instruction to be. The instructional objectives are usually the starting point, and serve as the basis for all other instructional design decisions made during the instructional design and development process (Dick and Carey, p. 5). As explained by Dick and Carey, the objectives establish the purpose of instruction in terms of desired learner outcome behavior or performance, conditions under which the behavior is to be evaluated, and standards for evaluation and assessment.

In terms of learner assessment, then, objectives tell the learner, at the outset, what he or she is expected to learn in the course of the lesson. For the instructional designer, identifying the objectives of the instruction to be delivered is a critical step in choosing the best cognitive and presentational strategies for the instructional material and involves awareness of the learner's needs as well as issues such as cognitive styles, need for learner interaction, and other related concerns (p. 126).

For the instructional designer who is developing CBI or WBI, instructional objectives appear to be as critical as they are to the designer of "traditional" instruction. That is, for the designer, objectives are a critical step in (1) the designer's choice of the best cognitive and presentational strategies for the instructional materials to be developed as well as (2) in the choice of best media for instructional delivery and other, similarly critical decisions in instructional development (Pernici and Casati, pp. 246-247). Basically, the designer of computer- or Web-based instruction has to know the outcome intended -- learning desired or task to be achieved -- and the assessment method that will be used to evaluate that outcome before the designer chooses the best way to inform the learner about those objectives.

## Objectives' Role in Learner Orientation

The instructional designer has to plan so that the initial objectives provide, for the learner, clear and reasonable expectations about the assessment phase of instruction. In general, because multimedia instruction is usually at least one step removed from face-to-face teacher-to-student interaction, the statement of objectives at the beginning of a lesson plays a critical role in learner orientation. For distance learners, the stated initial objectives of an on-line course of study or a CD-delivered tutorial may be the chief means of allowing the learner to self-advise in selection of one course of instruction over another (Benson, 1994).

In addition, for "remote" or CBI instruction delivered as "automated" computer-tutorials, initial stated objectives have proved to be important as "advance organizers" for learners' outcome performance. For example, in an experiment by Beasley and Waugh (1996), groups of college students studying computerized units of instruction showed remarkably different test scores and significant differences in content retention that were affected by only one experimental factor. The experimental group of students was told that, after viewing the instructional materials, they would be asked to draw a concept map of how the topics of the lesson related to one another. Knowing the objective -- and the means of assessing what they were to study -- acted as a powerfully effective "advance organizer" in allowing the students to view the instructional materials in the context of the performance goal and to perform the target task far better than the control group, who were not told anything other than that they were to "cover" the unit of study. Not only did the experimental group -- the ones told the objective -- perform better than the control group, these differences in assessed performance were still present a week later when the two groups were given a "pop quiz" to check their retention of the information. Again, the group that was informed of the assessment objective performed significantly better than the "unknowing" control group.

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## Objectives and "Just-in-Time" Learning

The role of learning objectives as indicating performance outcomes and being critical in deciding on a course of study is also related to the issue of "just-in-time" learning, which is an important source for Web-based learning and instructional design. Just-in-time learning is information delivered "so that each individual may learn just what he or she needs at the time when he or she needs it" (Romiszowski, 1997).

The "just in time" learning concept is related to the idea of both goal-oriented learning and to performance-based assessment. It is therefore similarly related to the requirements that objectives and assessment outcomes be clearly established from the beginning of the instructional development process so that the instructional designer can choose which cognitive strategies and which presentation and assessment methods are most probably going to result in the desired learning.

## Feedback to the Learner During Instruction

In addition to a final assessment, in the sense of an overall "grade" for the learner who completes the unit of multimedia instruction, Bergman and Moore discuss three types of more sophisticated feedback categories for learner interaction that they believe should be considered by the instructional designer: Informative feedback, that simply identifies a correct or incorrect response; Reinforcing feedback, that praises or critiques (both of which should be limited); Diagnostic feedback, that involves comments or suggestions about the learner's response.

Dick and Carey (1996) — agree, believing that learners need a variety of types of feedback during the course of the lesson in order to improve their performance on the final examination for the instructional unit (p. 192), which applies whether the instruction is delivered in the electronic or the traditional classroom. Even more important, then, is feedback to the learner using multimedia instructional materials in lieu of an instructor's providing this type of interaction.

## Learner Assessment via Computer-Scored Testing

Online or computer-based multimedia instruction can utilize instructor-based evaluation in a multitude of forms, just as the face-to-face classroom setting affords multiple methods of evaluation. One method of evaluation that is unique to CBI and WBI is the option of having the computer score the student's work and record a grade "automatically."

As more and more emphasis has been placed on behavioral objectives and "statements of explicit behaviors that learners must demonstrate, it has been increasingly obvious that a fair and equitable evaluation system is one that measures those specific behaviors. Although it is possible to create computer-based testing and scoring, there are many concerns related to this type of evaluation. Grades are grades, and students are sometimes ingeniously determined to improve their grade point averages or acquire credit where credit is definitely *not* due. One solution to the academic honesty issues appears to be administering "final" exams in proctored computer labs. Other possible approaches to the issues of academic honesty and reliability raised in relation to assessment of student learning in CBI/WBI instructional modules may involve use of the technology that has introduced the problem in the first place. For example, some virtual colleges and online universities are discussing use of security and identity-verification methods, such as voice recognition or fingerprint-recognition systems.

## Online Course Assessment Methods

Two basic types of assessment for online college-level courses prevail: (1) those with CBI and "automated" or computer-administered types of instruction, the most typical final assessment method is the proctored exam, and (2) those with instructor-monitored distance learning types of instruction, with the most typical assessment method being criteria-based evaluation, with a final grade assigned by the instructor (Rasmussen *et al*, 1997).

Instructor-monitored distance learning courses tend to follow one of two models: (1) the "portfolio" or "contract" model, with students turning in frequent, small reports or completing a scheduled, sequence or series of assignments, and (2) the project model, in which the student turns in, at the end of the course, one big project or term paper (Hudspeth, 1997).

An example of typical statements about proctored tests and exams is this one from Indiana University's online Chemistry 101 course:

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Quizzes and Exams preferably can be taken on the Internet. This will require that you have a proctor with a computer system that meets the system requirements to administer the exam or quiz. Your proctor should be associated with a reliable office or agency in your community (employment supervisor, library, high school, bank, office, business personnel, etc., (no relatives or personal friends). If this is not possible, a second option is to find a proctor with faxing capabilities....We suggest you make arrangements with your proctor and have him/her complete and return a Proctor Agreement as soon as possible (by or before the orientation meeting). This signed agreement is a necessary prerequisite.
( http://weblab.iupui.edu/oncourse/courses/c101demo/ )

Clearly, age-old concerns about ethical practices in assessment (i.e., cheating) take on new twists in the distance-learning environment. The issue of authorship of student work has always been one that is difficult to resolve, even when the course is taught with traditional methods. A statement about expectations for online students, again from Indiana University, illustrates a common philosophical approach to the problem of authorship:

Much of American life operates on the honor system — and so do a number of areas of this course. Thus the laboratory work and write–up, the homework assignments are done away from University supervision and are expected to be performed by you and you alone. Violation of this expectation ultimately hurts you more than anyone else.
( http://weblab.iupui.edu/oncourse/courses/c101demo/ )

## Portfolio and Project Instructor-Based Learning Assessment
During the Web Based Training Online Learning '99 conference, Brad Cox, author of the award winning, *Taming the Electronic Frontier,* was asked how he evaluated instruction in his online course. He replied:

Briefly, I rely primarily on experiential learning (action learning). Each task presents instruction, invites the student to put it in practice and report the results in the context of the material that preceded this task. Some tasks have students read web-based or paper-based materials, summarize what it says, and demonstrate that they have applied each lesson to the web-based portfolio. Other tasks, such as the desert crash simulation, portfolio peer assessment, and web-based sociometric tasks, take a more quantitative approach. Each student produces a web-based portfolio and participates in a semester project. These provide considerable insight into how well the student is doing, both by me and the student's peers.

Cox's approach recommends using a series of small, sequential, individualized tasks and student-centered personal responses to provide multiple checkpoints during the online course and ensure that students, in order to complete the assignments, have to keep up with the class readings and respond to class assignments themselves. Multiple, individualized tasks are harder to counterfeit because of the necessary coordination and planning involved for the student to arrange for someone else to do the work in a timely and appropriately specific manner.
Cox suggests a sequential, portfolio-style approach to the student's progress through a course and assessment of that progress. Another, somewhat similar, approach is recommended by DeLayne Hudspeth (1997) in discussion of "just in time" learning programs. Hudspeth (p. 356) recommends a "contract" approach, which he describes as:

A written agreement, a learning contract, which defines what the instructor is proposing and what the student agrees to do. The initial syllabus might describe 20 possible assignments of which the learner must provide the first six or eight (the "must know" content), but could select another six or eight "nice to know" outcomes from an extended list. The final list could reflect individual interests or different career backgrounds. Perhaps two or three unique outcomes could be negotiated with the instructor. If a grade system is used, then a predetermined number of points could be required for a specific grade.

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Hudspeth points out that the benefit of using a contract-type approach is that the course assignments and the criteria for their completion can be explicitly described for the student, but the student can use considerable flexibility in exploring issues and resources that have personal interest. This approach should encourage the student to see the benefit of actually doing the learning rather than trying to find a stand-in (p. 356).

Another method of online course assessment, particularly for adult learners, is the completion of one large end-of-course project (Mood, 1995). For example, in a business course, students may submit, at the end of instruction, a fully developed business plan or, as the final project in an online course, the student may be required to submit a substantially researched term paper.

With project-based assessment, the dangers of having the student simply purchasing a pre-packaged term paper are diminished the more individually the project is tailored to the resources used in the course, the student's individual interests, and the use of intermittent "checkpoints" -- such as weekly, brief, e-mailed "progress reports" that are individual and specific enough to reduce the likelihood of students' thinking they can submit someone else's work and avoid being found out (Hudspeth, p. 354).

Others suggest using Internet-based videoconferencing or online synchronous class discussions or similar performance-on-demand type class activities as part of authentic or performance assessment of student achievement. In addition to encouraging participatory learning, enhancing student communication and/or technology skills, and interaction between isolated learners or between learners and the distant instructor, these "real-time" performance activities also tend to ensure, incidentally, that the actual student be present and accountable for course content.

## Durability of Final Assessments

"Final" evaluation for certification or course credit is unlikely to be eliminated anytime in the near future. However, the advent of the technology that has provided the means to offer computer-based or online courses of study has also caused the re-evaluation of assessment issues, such as what should be assessed in a virtual, for-credit course. Many issues are currently being debated, including how to best create learning environments and evaluation procedures that encourage the application of knowledge rather than rote memorization; how to design instruction to help learners to think for themselves; and how does computer based learning works in conjunction with other resources in the planning, implementing, evaluating and improving loop? (Harvey, 1998)

In discussing learner assessment, the role of the instructional designer is growing. Because the instructional designer is intimately involved in establishing the instructional objectives for instruction as well as the assessment instruments by which the student's learning will be judged, the instructional designer's role is critical to insuring that CBI/WBI instruction works as expected. Since the instructional delivery is often remote, and results are sometimes difficult to evaluate in terms of instructional effectiveness, the unique position of the instructional designer is more critical to the development and evaluation of technology-based instruction than ever.

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