Options and Considerations for Distance Education Learner Assessmentand Self-assessment

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Introduction

The explosion in distance education programs and the associated course offerings that has resulted from the accessibility and reliability of the internet has moved distance education professionals to reconsider a number of program components. These have ranged from instructional systems (design) to level of program (diploma, high school, university) to administration (registration, fees, scheduling) and to faculty (full-time, part-time, student supervision). One component of distance-delivered programs that can particularly problematic is the evaluation or assessment of learner achievement for, in the final analysis, modifications to existing delivery models (face-to-face, dual and single mode institutions), no matter how innovative and effective, must still be held accountable for the integrity, reliability and validity of the assessment procedures of the learners.

Traditionally, the assessment of learning has been categorized as either formative or summative. Although are sound instructional events that call for the use of formative evaluation by the instructor, by the textbook or by other students, in this article formative evaluation refers to an instructional strategy whereby learners are provided with means (i.e., an objective, criterion-referenced test) to self-assess the degree to which they have mastered a pre-defined set of outcomes or competencies (Bloom et al., 1971; Guskey, 1985) during the instructional time frame. These self-tests are typically tied to goals and objectives of the course that are both hierarchically and temporally related and, especially in a mastery learning instructional model, are the means for deciding whether or not the learner should progress to a subsequent set of instructional sequences. Often, the scores that are obtained on these on-going tests are not used for summative evaluation but rather are employed as instructional milestones or decision points and call for feedback, corrective/prescriptive action and even enrichment activities. With respect to summative evaluation, there are many options available to an instructor (e.g., continuous assessment of a complex project) but the options for the distance educator are somewhat limited. In this paper, summative evaluation refers to what are typically called a final examination in which the learner is evaluated for the degree to which the goals and objectives of the entire course have been mastered. Usually, in this scenario, no feedback is provided other than a total score or percentage.

The media for making available both formative and summative examinations or tests is, to a great extent, a consequence of what resources are available to the instructor. Paper and pencil have been the media of choice for many years and for a number of reasons but recently the computer has made its way into the arena. This has been particularly true for distance-delivered programs and success has been reported in the medical field (Fleming, 1987), teaching (Ezeani, 1982), psychology (Buchanan, 2000), chemistry (Ananda, 1989) and adaptive testing (de la Torre and Vispoel, 1991). Although, many educators cite the advantages of distance education evaluation, some (Huber, 1989) caution that attention must be paid to learners during the development of instructional materials, to learners during the learning process and to learners after a sequence of learning or there is the strong likelihood that distance evaluations will fall short of what has been done with other media.

Assessment options

In this paper, we will distinguish between two types of assessment options for the distance educator: (1) distributed and (2) on-line. The former occurs when the instructor issues to each student the required software (run-time files) that must be installed on the distance learner's local PC and that will allow for the taking of both formative and summative examinations on the learner's desktop system. The obstacle to be overcome for this distributed option is getting the run-time files to the learner for installation. Typically, these files can be mailed on a floppy diskette or a CD-ROM or they can be downloaded from the internet. A description of the installation procedure for one of the test generation programs in table 1, the Examiner, will be given below.

The second assessment option, i.e., on-line, takes place when the learner simply directs his or her browser to a specific internet or web page and interacts with the prompts (buttons/input fields) that make up the examination pages or screens. There are no files to be installed on the learner's PC and this feature is particularly attractive for its straightforwardness and simplicity.

It should be noted that, for both assessment options, three required parameters for the provision of a summative examination must be available: (1) the setting of a time limit of some duration, usually 90 minutes; (2) the inclusion of "password protection" for the examination test file and (3) the suppression of the feedback (e.g., correct/incorrect, a chapter/page reference) that accompanies each test item. Also, it must be impossible for the learner to access the summative examination file more than once. If this were not the case, the learner could respond to the summative test items as he or she wished until all questions were answered correctly. The password protection feature (#2 above) does away with this possibility.

Software Options and Features

To carry out an assessment of the competencies or outcomes of distance learners, the distance instructor has a number of options that range from the writing of academic paper to the completion of an instructor-prepared or normed examination to the production of a project or portfolio. However, for those instructors who adhere to a mastery model, the rationale for employing formative evaluation is the provision of very specific information on the individual student's progress during the learning process. The test items that make up a formative examination are always closely linked to the prepared learner outcomes or instructional objectives and are presented to the learner with minimal lag-time following the instructional sequence. In contrast, summative examinations are implemented at the end of all instructional sequences and are used to determine mastery and to assign grades. Both can be incorporated into distributed and on-line assessment.

For those distance instructors who opt for formative or summative examinations, one very significant procedural concern is the means by which an examination can be made available to the learner: There are essentially two: (1) by the internet/World Wide Web or (2) by the student's local PC (personal computer). Both options have advantages and disadvantages from the perspective of instruction and they will be discussed below. A first consideration, however, is the suitability of the test generation software that is used by the instructor for either option. Table 1 lists 5 of the most popular desktop programs for the implementation (construction, scoring, record keeping) of distributed and on-line tests:

Table 1. Test generation software

	C-Quest Web	Exam Manager	Examiner	FastTEST Pro	MicroCAT

Item types					
Multiple choice	Yes	Yes	Yes	Yes	Yes
True/false	Yes	Yes	Yes	Yes	Yes
Matching	Yes	No	Yes	Yes	Yes
Item capabilities					
Weighted items	No	Yes	Yes	No	Yes
Weighted responses	No	Yes	Yes	Yes	Yes
Spell check	No	No	Yes	Yes	No
Graphics	Yes	Yes	Yes	Yes	Yes
Audio	Yes	No	Yes	Yes	Yes
Video	Yes	No	Yes	Yes	No
Turn on/off feedback	Yes	Yes	*Yes*	Yes	Yes
Test types					
Randomized items	No	Yes	Yes	Yes	Yes
Randomized alternatives	No	Yes	Yes	No	No
Administration					
Network	Yes	Yes	*Yes*	Yes	Yes
Diskette (local PC)	No	No	*Yes*	No	Yes
Internet	Yes	Yes	*Yes*	Yes	No
Security					
Test passwords	Yes	Yes	*Yes*	Yes	Yes

In assessing these various test generation programs, attention must be paid to specific features if the distance educator intends to utilize both distributed and on-line versions for both formative and summative examinations. With this in mind, note that 2 of the programs, FastTEST Pro and MicroCAT, do not allow for the administration of tests via the internet. Although this is likely to change in the very near future as it is obvious that the marketplace will expect that such a feature be a function of all test generation software, as it stands now, neither of these packages would serve as candidates for distance education assessment as they do not allow for the production and implementation of on-line examinations.

From the perspective of distributed examinations, note that 2 do not allow for the taking of tests on the students' local PC (C-Quest Web, Exam Manager). Typically, this is done by the students installing a set of run-time files on their desktop computer followed by the instructor distributing individual test item files by electronic mail attachment or by having the students download them from a specific web site or page.

Another feature that is mandatory is a function that is executed during the creation of the examination and that allows for the turning-on or turning-off of the feedback that is given to the examinee if the response is incorrect. This instructional strategy is very powerful but is only to be used during formative assessment. The distance education instructor will want to turn-off this attribute of the test items when those same items are included in the generation of a summative examination. This is predicated on the assumption that the database or test item bank that will be used for both types of examinations will be the same. All 5 programs meet this criterion.

Finally, when creating summative examinations, the distance educator must be able to assign a password to each student's file to ensure that the file cannot be accessed until a specified time. This feature, coupled with the "time limit" feature, gives the distance educator a great deal of control as to when a summative examination may be taken, regardless of where the student is located in the world.

A close study of table 1 suggests that, for the provision of both distributed and on-line formative and summative examinations, the Examiner is, for the moment, the best candidate. The features that bear most heavily on what is required for the distance educator have been highlighted. In addition, the Examiner allows for the installation of the run-time files that are required for distributed (i.e., local PC) assessment by floppy diskette. Although this can work well, the author has simplified this process by the construction of a self-extracting executable file (3.6 Meg.) that can be sent to students via CD-ROM or downloaded from an internet site. The installation process takes just a few minutes. Once the run-time software is up and running (and the Examiner desktop icon automatically displayed), the instructor need only send to the students the test item files via e-mail attachment. Both formative and summative test files are accessed by double-clicking the Examiner icon and selecting the relevant test.

Considerations

If a distance educator is contemplating the assessment of distance learner achievement by individualized examinations or is considering integrating a mastery learning formative evaluation component into the curriculum or both, then the following factors should be taken into account:

Accessibility. One factor that has long been known to have a serious impact on the efficient and productive use of computer systems is the matter of ergonomics or human computer interaction (Card et al., 1983; Shneiderman, 1992). This poses a challenge to the distance education on many fronts including the implementation of formative and summative assessment procedures. A strong case can be made for configuring all examinations to be accessed by the internet as it calls for a very low level of user or learner computer competency. Indeed, the learner need only know how to point a browser program to the correct address and to select the various options by means of the mouse or some other pointing device. In the case of both types of examinations that are taken on the learner's local PC, the demands are slightly greater and there is a higher probability of problems surfacing but the advantage is that the learner does not require a connection to the internet to complete either formative or summative examinations. The only functionality that is required is the capability to send and to receive e-mail attachments.

Flexibility. The use of distributed and/or on-line examinations provides the distance

education instructor and students with an entire suite of instructional and learning tools that integrate especially well with a mastery model of learning. In addition, utilizing either assessment option with tests that are password-protected allows for the implementation of summative examinations.

From the learner's perspective, the flexibility feature manifests itself in the lack of restrictions that are placed on the test taker. If both assessment options are made a component of the distance course, then the learner can access either type of examination at any time and in any place. If the on-line option is the only one available, then the learner will be constrained by place as an internet connection must be accessible.

Synchronous/asynchronous. A useful way of categorizing educational systems is to analyze them from the perspectives of same/different, time-place combinations. In table 1 below, there are 4 combinations (e.g., same time, different place) that convey perhaps the most important distinguishing characteristic of conventional (i.e., face-to-face) and distance education institutions. Not surprisingly, distance education delivery systems by definition are grouped under the "different/place" label as the instructors and the students are normally geographically dispersed. For the distance educator who has adopted the mastery model, formative evaluations (e.g., self-assessing unit tests) would fall under the "different time/different place" cell while summative evaluations (e.g., password-protected examinations) would be slotted under the "same time/different place" cell.

Figure 1. Assessment options (Wheeler, 2000)

		TIME	
		Same	Different
PLACE	Same	Conventional -non-mastery model	Conventional -mastery model
	Different	Distance education - (synchronous)Summative evaluation	Distance education - (asynchronous)Formative evaluation

Security. Another issue that can be viewed as problematic for the credentialing of distance education students is the matter of test-taking security. This applies only to summative examinations (same time/different place) and the concern focuses on the identity of the test taker. Presently, there is no completely reliable means to determine who has completed either a distributed or an on-line summative examination. That is, it is impossible to be absolutely certain (invigilation would be the only way to do so) that the student who had completed the examination was indeed the registered or legitimate student. The only solution to the problem is to require that all students complete the examination AT THE SAME TIME regardless of where they are located and regardless of what type (distributed or on-line) of assessment option is being used. The on-line version is easy to control with respect to the time frame as one need only program the web-based file (i.e., each student's password-protected test file) to be accessible for the predetermined specified period. In this case, students who live in other time zones must be certain that their test-taking window coincides with the time zone in which the examination web server is located. In the case of the distributed option, the students can be e-mailed the password for their individualized examination a few minutes before the pre-arranged time (also taking into account the differences in time zones) and are also REQUIRED to return the summative examination test file within minutes after the examination is completed.

Recommendations

If the decision is made to proceed with designing and implementing a distance education assessment procedure, then a number of factors must be addressed. The following are some of the most pertinent:

1. To ensure as much as possible that the individual who is completing the summative examination and doing so in a singular manner, all students should be required to respond to the test items at the same time regardless of where they are located;
2. Tied to this is the requirement that the test item bank be sufficiently large that there is little likelihood that any two examinations will have a significant proportion of identical items. Typically, this calls for a pool of items from which the summative examinations are drawn that exceeds the number of items on each summative examination by a factor of 3. Also, some test generation packages (e.g., the Examiner) allow for the generation of parallel test items. These parallel items are multiple test items that focus on a single learning objective or outcome of which only one is selected when a test is generated;
3. For both formative and summative examinations, students must be instructed on how to access the test item files regardless of the assessment option. For the on-line delivery option, the instruction will be minimal;
4. If possible but taking into account the degree of instructor expertise and the level of institutional support, both assessment options should be available;
5. Finally, for the near future, the Examiner appears to be the best candidate for distance education learner assessment and self-assessment.

References

**Ananda, A. L. 1989. Design of an Intelligent On-Line Examination System.
Source: Computers and Education, 13, 1, 45-52.**

Bloom, B. S., Hastings, J. T., & Madaus, G. F. 1971. Handbook on formative and summative evaluation. New York: McGraw-Hill.

Buchanan,T. 2000. The efficacy of a World-Wide Web mediated formative assessment. Journal of Computer assisted Learning, 16, 193-200.

Card, S., T. P. Moran & A. Newell. 1983. The psychology of human-computer interaction. Lawrence Erlbaum Associates.

de la Torre, R. &Vispoel, W. P. 1991. The development and evaluation of a computerized adaptive testing system. ERIC Accession No: ED338711.

Ezeani, C.E. 1982. Evaluation procedures in distance teaching system: the experience from COSU. Adult Education in Nigeria, 7, 119-32.

Fleming, P. 1987. Computerised formative assessment - a powerful new tool. In J. Barrett and J. Hedberg (eds.), Using computers intelligently in tertiary education. A collection of papers presented to the Australian Society for Computers in Education, Sydney, 1987.

Gruskey, T. R. 1985. Implementing mastery learning. Belmont, CA: Wadsworth Publishing.

Huber, G.L. 1989. The evaluation of learners in distant education. Paper prepared for the conference on "Modelos de evaluacion en la ensenanza superior a distancia" at the Universidad Nacional de Educacion a Distancia, Madrid, Spain, 1989.

Natal, D. 1998. On-Line Assessment: What, Why, How. ERIC Accession No: ED419552.

Shneiderman, B. 1992. Designing the user interface: strategies for effective human-computer interaction. Addison-Wesley Publishing.

Wheeler, S. 2000. Instructional design in distance education through telematics. Quarterly Review of Distance Education, 1, 1, 31-44.