Assessment of Assessment Techniques for e-learning

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Abstract. The effectiveness and sustainability of a distance learning environment strongly depends on the proof that students actually learn what they are supposed to. Thus a major topic regarding distance learning is the way a professor can decide the degree to which a student absorbs the proper knowledge, the so called "*student assessment*". But what is the proper assessment system an instructor should use in the corresponding case? There have been introduced various methods for student learning evaluation consisting of self assessment, student portfolios, success indicators, peer assessment etc. The topic of the paper is to present the way to chose one of the appropriate methods that is more effective for the corresponding case.

1 Introduction

There have been written many books, articles and papers on e-learning since its first appearance in the form of Computer-Based Training (CBT), in 1990. But what is e-learning in fact? As mentioned in [1] "*e-learning can be defined broadly as any use of Web and Internet technologies to create learning experiences*". There have been proposed and implemented quite enough diverse types of e-learning experiences. Some are learner-driven, instructed or have the form of telementoring. Whatever the distinctions amongst them the basic and crucial question posed is in what degree the learner indeed absorbs the desirable knowledge. The acquisition of this information makes any distance education system ready to move forward and either provide the student with the next cluster of knowledge or certify his/her adequacy of the learning subject. This is the point where student assessment has to come to discussion.

Assessment is the procedure where the system obtains information about the progress of the student. Palombra & Banta ([2]) define student assessment as "*the systematic collection, review and use of information about educational programmes*"

undertaken for the purpose of improving student learning and development". Considering the above, it is more than clear that student assessment is one of the components of e-learning that differentiates it from content delivery via web mechanisms.
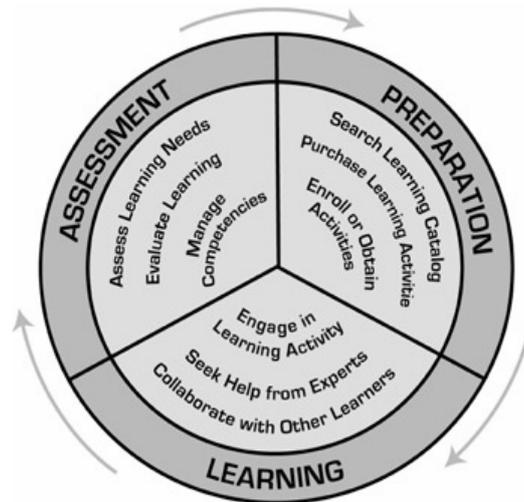

Figure 1: The Learning Cycle.

Figure 1 presents the "Learning Cycle" according to Piskurich ([3]). The involvement of assessment and evaluation of learners' progress takes an equal part of the educational process along with the preparation and educational stages. Thus, the thorough consideration and the proper use of suitable assessment techniques play a major role in the success and sustainability of a distance learning environment.

Nevertheless, not all e-learning levels can integrate all methods on the topic of user–student evaluation and this is due to the variety of developed e-learning cases and their different character ([4]).

Distance learning can be classified in levels exactly like traditional learning procedures. The need for learning either it concerns the acquisition of a university diploma or a customer training on a product remains intense in distance education as in the traditional education institutions. The basic distinction cannot only be found in the delivered content of the courses but also in the systems' functionality and interfaces. Thence a classification of basic educational levels could be the following:

- **Primary and higher school education**. There has been some work done in the field of distance elementary education although in an early stage [5]. In most of the cases the distance education modules are used as a supplement in the fundamental education process and by no means can substitute it. Learn-

ing is mainly conducted through online games and leisure activities based on didactic material.

- **University- Career development courses.** Many institutions have already launched specific courses which are carried out exclusively by means of distance learning ([6]). In particular the initiative of open universities has been strongly supported by the existence and extensibility of distance education platforms which were ready to fulfil their expectations. In the specific area of university education the e-learning practices have been developed in a high degree.

- **Worker development - Vocational Training**. Another really important part of the learning field is the vocational training. This is used mostly to provide the novice or potential employee with the necessary competences to fulfil the requirements of the prospective employer. This type of learning systems applies to private companies in order to enhance the knowledge and capabilities of their personnel. This is also a very promising and wide area in terms of e-learning methods used.

- **Customer training.** There are many companies that provide training to their customers for the best usage of their products. Taking into account the distance learning platforms that have been developed, this tactic is being adopted by even more vendors. The condition in this case is far simpler since the training material is highly constrained according to the requirements of the concerning product. Apart from that, the participation of learners is not obligatory by means of time constrains and tasks fulfilment.

The awareness of assessment process maintains the connection between the learner and the tutor since it is providing straight feedback. The assessment strategies save time and effort from recycling previous knowledge plus they provide the flexibility of giving each student what they really need to know independently from the progress of their colleagues' knowledge.

The existence of assessment procedures in an educational system has many important outcomes. The basic outcomes of an assessment system, either it's a standalone system or integrated in an e-learning platform, either it applies to a University course or to a Vocational centre course, are summarised as following:

- Certification of the students' success in taking the course. It reassures the professor that the teaching goal is achieved.

- Measurement of learners' knowledge and competences in advance of the course. This way the identification of any problems is achieved providing a way towards their solution.

- Supplement all the entities of the system with feedback for further improvement. The students have the chance to self evaluate their progress, thus evolving in the educational procedure. The instructors also receive a quite valuable feedback which definitely can support the improvement of their

educational practices and last but not least the learning system with regard to technical and practical aspects can greatly improve.

In this paper we have made an attempt to present the most important assessment techniques in concordance to the various types of e-learning experiences. The major issues an instructor has to take under consideration are shortly analysed at section 2. Section 3 presents the assessment methods and the way they can be used in the redefined e-learning sectors.

2 Issues to Consider During the E-learning Implementation

When it comes to deciding the methods and practices that best fit in each corresponding case, some basic issues have to be solved first. Assessment is a very general term and could cause some disorientation unless the following are considered:

- *Technical feasibility aspects*. It is pointless to decide on a method if it is complicated to use it. The students will unwillingly use even the best assessment tool if it is hard to learn how to use it and it's not user friendly and appealing to them.

- Take into account the *real needs of business – academic course*. Even in the cases of the same didactic material offered, it is possible to have a totally different assessment system. The final selection of what the learner is required to use, has to be made by the entity whose needs drove to the delivery – participation to the course. That means, for example in the case of a company who carries out a programme to enhance the competences of its employees, the final decision of "What the learner should know" is given by the company itself.

- *Adaptive assessment* analogous to the learner's state. A good assessment system must be adapted to the special case of each user. There is no meaning in assessing a user on a matter he is already aware of, only because the rest of his/her course mates need to be tested for their knowledge on it.

- Define the *form and duration of the course assessment* procedure. Born ([4]) categorises the student assessment procedures in types; the formative and the summative. The formative is conducted during the course. The student's activity is constantly evaluated and stored. The summative on the other hand is carried out after the completion of a course with the objective to compare the user's results with some predefined sets of standards. Especially in the case where the assessment procedure is embedded in the e-learning system the selection of one or even both of them has to be done in advance in order to avoid confusion and strenuous repetition.

- *Handle Cheating*. A key issue in distance education is the possibility of students' cheating. It is a quite difficult task to identify and validate a student in all his/her appearances in the learning route. Especially in the case of the

user's evaluation, cheating is prompt to happen far more easily. This could be done in two ways. Either among the mates of the course or involving a different person with the relevant expertise. An important a priori decision in the design of an assessment process is the selection of some of the following ways to minimise possibility of cheating:

- Offer tests frequently so that the helping person may not be available that often.

- Mostly use critical questions that require more skills than good memory of the curricula.

- Deliver different questions to different students.

- Allow a limited period of time for the tests.

- Make students self monitoring their work. The use of rubrics especially could offer a lot of solutions in the field of cheating. The careful listing of the steps followed for the task to come to a completion is hard to be copied since it's usually unique for every person.

- Clearly state the *assessment regulations* and thoroughly explain the *procedure* and details to the learners. The last thing any instructor would want is to receive an unsatisfactory feedback from an actually good learner, only because he/she is not very well acquainted with the assessment system's details.

- *User feedback.* This is the point were the emotional state of the student comes up. Bad performance along with disappointing comments and strong advice by the system are enough to discourage the student's further participation and endeavour to the course. Thus even the students who give the worst expected results have to be handled with care.

- Special care must be given to the difficulty level of the overall student evaluation process. In case success is easily achievable, the reliability of the course is possible to be questioned. On the other hand if achieving a good grade is considered impossible, disappointment is the dominant emotion of the learners. Thus a very careful design of the assessment procedure and content questions is crucial.

- Give the sense of fairness in the assessment process as in the whole educational process.

- Disseminate the assessment results as a proof of past students' success

Section 3 presents the assessment methods and the way they can be used in the redefined e-learning sectors.

3 Assessment

When it comes to decide the methods and practices that best fit in each corresponding case, some basic issue Regardless of educational distinction, level or desired certificate acquirement some of the methods suggested so far apply straight and effectively in the majority of the cases. Some of the most interesting methods are proposed by Buchanan [6]) especially for the case of University education. Nevertheless these methods could simply be extended in order to cover other learning cases as well. The proposed methods are presented below.

3.1 Participation

One of the most widespread methods of online assessment relies on students' participation to the course. The issue though is finding the way participation can be defined as a measure. A major problem arises when "participation" is not clearly defined or articulated. Instructors should provide guidelines for their expectations of participation: The decision whether it is a quantitative or a qualitative or a complex measure has to be made strictly by the instructor-administrator of the course. Thus the aspects an instructor – administrator, has to take under consideration, are viewed in two different ways. The quantitative approach takes into consideration the percentage of assignments a student completes, the number of replies to other students' inquiries, the total remarks he/she has posed to other students work and so on.

On the other hand the qualitative approach comes to consider the content of the students' tasks and the method utilized to integrate them. This aspect could be covered by the use of *"Rubrics"*. The Rubric Technique ([4]) is based on the filling of a matrix. This matrix contains analytically and specifically the steps that have to be integrated and designated for each task, along with a short description of the work done, and a grade of the completion of the task. Apparently this technique relies on the students' awareness about his/her own work. The overall result of each task from a content point of view has to be assessed directly by the tutor also giving great consideration to feedback of the student.

The key issue in the technique of participation is the instructor's clear statement of his requirements on students' participation (which activity is giving credits, how much credit is being given by all the specific activities and so on).

This method is ideal for university level education as students have the critical perception to participate in such kinds of procedures. Vocational training courses could also use this technique since it can also enhance the cooperation and team work among colleagues. Customer training can incorporate the participation assessment in a looser way. Participation as an assessment method is difficult to be applied on the primary education since younger students are not expected to log in very frequently and actively participate in the didactic process.

3.2 Project Portfolios

Portfolios are collection of projects over training period and can include things like pieces of homework, papers, peer assessment reports, exams and tests, in-class writing, online discussion messages and so on. From an educational perspective, portfolios reflect the learner's experience on a thematic area. Project collections are very useful tools for measuring the student's progress, since they contain student work from the beginning to the end of his participation to a course. Thus they can reveal the student's changes over course duration. Like the other assessment techniques, portfolios in particular require explanation and assistance-students must be given detailed guidelines to avoid wasting their time over unnecessary tasks. So the assessment rules and principles have to be thoroughly explained to the students.

Student portfolios can be applied in the case of university education and primary education. If young students are shown the proper way of saving their work, portfolios is a very effective mean of their progress tracking.

Regarding training in a company environment, the portfolios could contain working material that an employee has to develop during his/her course. This material could prove to be extremely useful and be used further for in his-her work in the company after the course has come to an end. Finally in a customer training programme portfolios are again hard to work since customers are mainly interested in getting acquainted with specific products.

3.3 Self Assessment

The use of self assessment is a very promising technique in online education and is perfectly matched with the pedagogical specificity of Web-based learning in general.

Due to the fact that students are out of the class, possibly "alone" on their personal computer, self assessment can turn simple and hesitant participation to a more active engagement with the course. Students must be ready to adopt the technique of self assessment, as it is probable to fail, if students cannot be honest with themselves and the instructor. The development of self-evaluation strategies helps students gain control over their own learning process. As a result they are able to focus more effort in studying the specific areas where they need more time. What is asked by the students in the self assessment techniques is to show where they stand as learners. This is not always an easy task since students may not know what they really know. In order to help them solve this problem, the instructor must provide supplementary material such as checklists, rubrics, or inventories. This way he/she can guide the students in assessing themselves.

Self-assessment, as a formal and acceptable assessment technique, makes the first step towards a more abstract teaching and learning environment, which corresponds nicely to the idea of online environments.

Self assessment method is the most complicated for use by primary education systems. In this case, learners are starting to get familiar with more basic didactic experiences. If self knowledge is very hard, self assessment is out of the question.

On the contrary in the rest of the e-learning processes self assessment is easily applicable after a short period when students are getting accustomed to it. Especially in the case of customer training self assessment provides the learner the flexibility to decide whether he/she is satisfied with his/her up to now knowledge and bring his/her training to an end

3.4 Peer Assessment

Peer assessment is another way of subtracting a part of the duty of evaluation from the instructor and moving to the online education ways. Online environments are ideal for the use of this technique since students are released of the fear of being known as the strict person who issues bad grades to his/her colleagues. Peer assessment does, have the ability to encourage students to strive harder to complete assignments and participate more actively if they know their peers are evaluating them for their activity. Thus, peer assessment may raise the percentage of student engagement. Peer assessment online can be formed in a number of ways. Students can assess each other's participation very often in any kind of learning activity maybe except from tests and exams.

Instructors' role has to be active in this method as well. The instructor's role of the facilitator and mediator takes effect with peer assessment, as he/she must first provide guidance to the students as to assessment criteria and then work with both the assessor and the assessed to be sure the assessment was fair and systematic. Peer assessment takes time to work perfectly in online classes and novice instructors should use this with some caution. Students must receive a thorough training and information on the tactics of peer assessment.

Peer assessment proves to be very encouraging ([6]) for participation to learning procedure and cooperative work. It can be very well incorporated in the education process in higher, vocational and customer learning with an exception in primary education case. The peer assessment extremely resembles the self assessment from an applicability point of view although peer assessment requires more acquaintance and maturity since it is used to judge somebody's colleagues.

3.5 Tests, Exams &Games

The most popular way of assessing students' progress in established education can be used as well in the distance education practices. The traditional tests, exams and quizzes where the students responses are compared against a predetermined set of correct answers is very well applicable and technically less demanding in the cases of online assessment. Nevertheless the, creation of sets of questions and potential responses can prove quite perplexing and time consuming for the instructor. Bull and Dalziel [7]

suggest the use of question banks. Question bank is a collection of uniquely identified questions that allows the selection of questions for the creation of tests based on various predefined criteria. Questions are indicated with descriptors such as: the difficulty of the question, topic, academic level, and the skill or knowledge component addressed. Question banks allow authors to contribute and withdraw questions independently. The construction of question banks means that they offer substantial savings of time and energy over conventional paper or computerized objective test development. For conventional tests, questions are only described relative to the other questions in the test and to the group of students that took the test – they are specific to a group and individual test. Therefore each new test is developed independently from previous tests. Questions are identified by a number of descriptors so, to develop a new test, questions are drawn from a bank according to desired criteria. Typically, questions are piloted prior to inclusion in the bank to allow statistical measures to be gathered. Initially, when the bank is small, this may be time consuming, but a rolling cycle of piloting a few new questions each time tests are delivered allows the bank to grow and ensures the quality and characteristics of questions in the bank. The statistical data generated allow an evaluation of the quality, and hence improvements required, of the questions. For example, a question that is answered correctly by 90 per cent of a student group would probably be determined to be too easy – it does not provide input for qualifying the students.

This assessment can apply to all forms of distance education. Especially in the case of primary education, where other methods are appropriate, the use of quizzes, even in the form of online games, is perfectly matched with the requirements of primary education. In higher and vocational training, exams are a characteristic way of evaluating students. On the other hand in the case of customer training, people dislike the idea of being tested for their knowledge on a product they have spent money on.

4   Conclusions

The aforementioned strategies are a starting point for online instructors interested in gauging student learning in different ways. They do, as noted, require substantial effort on the part of both the instructor and the students, but, in the long run, provide excellent data to document student learning.

Regardless of the selected assessment technique the instructor has to take under consideration the abovementioned issues regarding the thorough explanation of the evaluation rules. This way the feeling of fairness will strongly support students and encourage them to advance in their education. What is more a successful assessment strategy should take into account the needs and requirements of all interested parties, the learner, the instructor and the course providing organisation.

References

1. Horton W., Horton K., (2003) E-learning Tools and Technologies: A consumer's guide for trainers, teachers, educators, and instructional designers, Wiley Publishing, Inc.
2. Palombra C., & Banta T. (1999). Assessment essentials: planning, implementing, and improving assessment in higher education. San Fransisco, CA:Jossey Bass.
3. George M. Piskurich (2003) The AMA Handbook of E-Learning: Effective Design, Implementation, and Technology Solutions Piskurich G. (ed), AMACOM.
4. Born A., (2003). Web-Based Student Assessment, in Anil Aggarwal ed, Web-Based Education, Learning from experience. Information Science Publishing.
5. http://www.k12.com/virtual_academy/participating_schools.html
6. Buchanan E., (2004). Online Assessment in Higher Education: Strategies to Systematically Evaluate Student Learning, in Howard C., Schenk K., Discenza R., eds. Distance Learning and University Effectiveness: Changing Educational Paradigms for Online Learning Caroline Howard, Science Publishing.