E-Learning Portfolio (ELP): Process Assessment Based on the Theory of Multiple Intelligences for the Evaluation of Online Leaning in the Age of Information

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Abstract

Online education is becoming increasingly important in classroom teaching nowadays. However, traditional methods of teaching evaluation focus only on the students' learning outcomes and have drawbacks of relying on static evaluation and ignoring dynamic assessment, incomplete evaluation information, one-sided evaluation, single evaluation subject, etc. ELP, a novel process assessment based on the theory of multiple intelligences, has the advantages of personalization, emphasizing process, diversification, achieving dynamic assessment and multiple feedback. In this article, the concept, content and characteristics of ELP are introduced, and the principles of establishing and implementing ELP are discussed.

Key words: E-Learning Portfolio (ELP); Information; Process assessment

INTRODUCTION

The pace of information revolution has been accelerated in the 21st century, and the resulting rapid progress in information technologies such as the Internet, the Internet of Things (IoT), cloud computing, and big data has created important opportunities for developing new modes of teaching in higher education. Novel online education models (e.g. micro-lecture, massive open online course, and flipped classroom) have broken through the bottleneck of traditional manner of allocating educational resources and resulted in significant reduction in education cost. It is essential to evaluate the effectiveness of learning in order to ensure the quality of teaching. However, the development of learning evaluation systems has been far behind the progress of the aforementioned online teaching modes in terms of content, method, and technique. Therefore, it is urgent to find an effective way to evaluate these newly emerging online learning models. Recently, E-Learning Portfolio (ELP) has caused increasing attention in that its unique process assessment for learning is based on the theory of multiple intelligences.

1. DEFINITION OF RELATED CONCEPTS

1.1 Process Assessment

Process assessment is an evaluation procedure that focuses on using certain techniques and methods to assess and explain the students' learning process and helping students in the educational activities to develop the ability of self-awareness, self-development and self-improvement. Self-assessment, peer assessment, and teacher assessment are the main components of the process assessment. The interaction and emotional communication between teachers and students are strengthened by their synergistic effect. Among them, the self-assessment allow students to evaluate themselves subjectively, participate in teaching activities, and assess their own behavior in terms of learning effects, learning attitude and classroom performance; then peer assessment can help students learn from others' resources, promote the emotional communication between them and cognitive collision,

stimulate learning motivation; teacher assessment is very difficult to be fully implement, as teachers need to find teaching problems from the whole course teaching, collect opinions and suggestions for improving the teaching assessment opinions in a multi-channel and multi-level way so as to promote the comprehensive development of students and their ability (Zhou & Zhang, 2015).

1.2 The Theory of Multiple Intelligences

The theory of multiple intelligences was proposed by Howard Gardner, a Psychological Development Scientist at Harvard University in his book *Frames of Mind* published in 1983. He pointed out that "human intelligence should be a measure of his ability to solve problems, linguistic intelligence, logical-mathematical intelligence, musical intelligence, spatial intelligence, physical intelligence, interpersonal intelligence, intrapersonal intelligence, and natural intelligence", but it does not exist that there is purely some kind of intelligence, and the only way to achieve the goal, each person will use their own way to find their own brain resources, creating the difference between human, this is known as the theory of multiple intelligences (Chen & Liu, 2011). This theory is widely used in the field of higher education, especially in the student learning assessment. Gardner thinks that human intelligence is not single ability but combination of variety of abilities. Consequently, the criteria and methodology for learning assessment should be flexible.

2. CONNOTATION AND DEVELOPMENT OF PROCESS EVALUATION BASED ON ELP

2.1 Definition of ELP

ELP refers to the way of use of information to show learning purposes, learning activities, learning outcomes, learning performance, learning to pay, learning academic progress, reflection and other activities in their own learning process, and it also records the whole process of tracking students' learning, development, reflection, improvement and so on.

Portfolio assessment refers that each student's learning performance is known indirectly through the student learning data recorded in ELP, and then the objective assessment of learning is made according to the record. The objective of ELP is not differentiation and selection, but the discovery of unique intelligence characteristics of the individual student and enabling learners feel their own progress and have self-examination. As one of the tools of process assessment, ELP concerns about the learning process. The assessment method was first applied to Art Education Project "Zero Project" at Harvard University, as the promotion of such project in the United States (Lu, 2012), it has been adopt by more and more schools for the evaluation of online learning.

2.2 Background of ELP Development

With the development of network technology, the online education in classroom teaching is more and more popular. At present, most of the online learning assessment still follows the traditional way, and has obvious drawbacks listed mainly as follows (Zhang, Dao, & Guo, 2007):

(a) Reliance on static evaluation and ignorance of dynamic assessment. Although the network test system has been developed by most of online education tools, the tests are almost in the form of objective question. However, the outcomes of learning can be in various forms. These tests may promote the knowledge learning of some disciplines, but can not truly evaluate the comprehensive quality of students due to the fact that the tests mainly focus on intellectual factors and ignore the non-intellectual ones.

(b) Incomplete evaluation information and lack of content. E-mail and online chat have been widely used for communication between teachers and students involved in the online education. There are variety of online tools that students can use to present and deliver information, and learning activities are scattered in different locations rather than taking place in a shared classroom. Long-distance education can not be fully and effectively recorded and monitored by most of the existing evaluation systems, and teachers have difficulty in knowing the reactions and performance of learners during such learning process.

(c) Single evaluation subject. In most evaluation models, teachers are the main body and students are in the passive position. This is one-way process in which students are passively involved in recording, progress analysis, information statistics, and reports.

(d) Traditional evaluation methods do not match with the new online learning. Online education, a new way of learning developed in the age of information, has unique characteristics (e.g. real-time network and information storage) that require the development of new assessment methods. The well-designed new online teaching model will not be effective if assessed using the traditional method.

Aimed at meeting the need for the development of online learning and teaching, portfolio assessment has been developed and increasingly popular as a new way to evaluate, store, process and organize online education in a digital and electronization way.

2.3 Major Features of ELP

ELP evaluation process has the following major characteristics: Firstly, purpose. The collection and selection of the materials in the school file is a choice with aim rather than in random, and it should be matched with a certain teaching goal. Secondly, diversity. In addition to the student's work, the description or record of the student's work process, as well as the student, teacher, companion and parent's evaluation of the work are included in the content of ELP. Thirdly, autonomy.

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The content loaded into the school file should be mainly decided by the students themselves. Fourthly, democracy. The teacher as a guide is fully reflected in the process assessment. Teachers and students are in the equal position to cooperate. Fifthly, self-reflection. To help students obtain self-reflection and self-summarization in the learning process is the most intuitive purpose of evaluation. Sixthly authenticity. The major objective is obtaining objective information regarding the progress, achievements and problems of students in some aspects through the collection of a large amount of materials and the reflection of the students themselves.

2.4 Advantages of ELP

ELP is capable of promoting the personal development and academic performance of students, and has unique characters and advantages shown as follows (Liu, Lan, & Ma, 2012):

(a) Personalized assessment. ELP helps to collect evidences for the learning process of individual student, demonstrated efforts, achievements, and progress that each student has made, and provide each student with the opportunities for self-assessment and self-management. During the procedure of the assessment, students participate in setting up the assessment criteria and evaluating the quality of learning (Wang, 2003).

(b) Emphasis on process assessment. Students' performance such as learning styles, learning attitudes, learning motivation, learning of the depth and breadth of knowledge, and cooperative learning can be analyzed using ELP. For example, online leaning time of a student can be calculated based on the log-on time and log-off time; information regarding the depth and broadness of the learning can be obtained by checking the amounts of data browsed, learning path, and the download and use of online resources.

(c) Multiple Assessment. Instead of evaluation based on single examination, information reflecting learning situation and learning ability can be collected using many different ways such as consulting learning plans, experience, notes, investigation, learning diaries in the learning files. The leaning process can be evaluated not only by teachers but also by students themselves and their classmates. Assessment criteria are no longer limited to a fixed standard and are more flexible.

(d) Dynamic assessment. ELP has the function of tracking and recording. Students have access to comments and feedback from others, modify their work accordingly, and then submit them again for online evaluation. The whole process of modification is saved in the database. And teachers can have a clear understanding of a student's learning behavior by browsing different versions of his or her works.

(e) Multiple form of feedback. ELP can shorten the assessment time. The content of feedback can be text, chart, or video presented as scores, grades, or comments, etc. There can be various forms for a certain type of presentation. For instance, scores can be presented in the form of absolute score, relative score, percentage grade, etc., so that students can understand their own relative position in the learning group.

2.5 The Theory of Multiple Intelligences

ELP is an educational concept that mixes multiple assessments. Various subjects, criteria and methods are emphasized. And it can be also used to evaluate the ability and promote the comprehensive development of learners. Some studies in western countries have proved that the use of ELP can reduce the stress and increase the self-confidence of students (Gülbahar & Tinmaz, 2006), create a colorful learning environment, and stimulate the learning motivation of students (Brown & Hudson, 1998). In the current study, we designed a model according to the internal relationship between the theory of multiple intelligences and portfolio assessment, as shown in Figure 1. A dashed box in the middle of the figure is used to show that there is no strict correspondence between them.
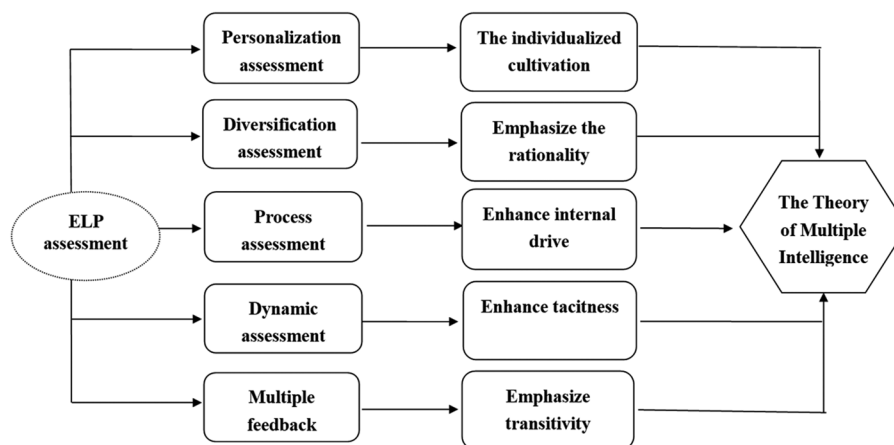
Figure 1
Multiple Intelligences Model for Portfolio Assessment

3. CONTENT AND CONSTRUCTION STRATEGY OF PORTFOLIO ASSESSMENT

3.1 Structure Model and Main Content

The ELP consists of electronic test, online discussion, my files and teachers space as the structure model shown in Figure 2 (Zhuang, 2005). Among them, the electronic test module generally has functions such as automatic generation of questions for online test, monitoring the test online, checking the answers by students themselves, the automatic marking of objective questions, and providing answers of subjective questions to others, etc.. In the online discussion module, the student can put forward and participate in the discussion of the question answered automatically by the system according to the keywords or answered by teachers and other students. The effectiveness of assessment depends on the participation frequency and quality of posts of students. Making learning contract, viewing learning rules, submitting works, browsing companion profiles, writing learning diary, viewing companion and teacher assessment were included in the main content of my files. Then the whole process management of student learning can be achieved. Finally, only teachers have access to the teachers' space module and thus play the role of main instructor in the assessment. Its main content is that the teaching goals and learning gauges are made and modified, and assessments are given by browsing the student ELP.
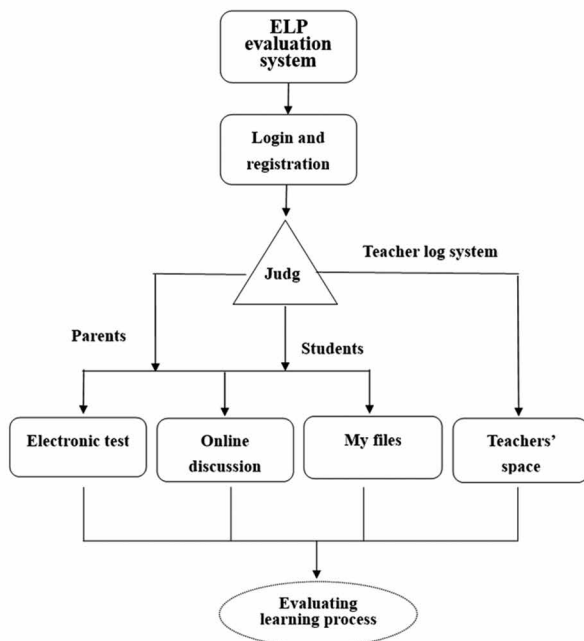

Figure 2
System Structure of Portfolio Assessment

3.2 Principle of Designing Education Evaluation System

(a) Aims. Reform Program for The National Education Curriculum (Trial) clearly states "The function of discrimination and selection should be emphasized if we want to change the function of the course evaluation. Then the function of promoting the development of students, the improvement of teachers, and the improvement of teaching practice can be fully improved. It is important to build up an education evaluation system to adapt to the need for new curriculum reform and to promote the development of students and teacher and the improvement of the quality of school education.

(b) The principle of equality. The course evaluation is based on the comprehensive development of students, and the relationship between the evaluator and the evaluation object are emphasized. Then a democratic and equal relationship is developed during the assessment. Finally bidirectional and interactive assessment can be made. Therefore, in the specific evaluation activities, teachers should play the main role in guiding all students to positively participate in the whole process of education evaluation. In this way, students can become an important part of course evaluation and behave well in the teaching activities.

(c) The principle of independent feedback. Increasing the self-assessment and self-reflection of students are one of the main aims of the reform. Generally speaking, in the early stages of education, students lack the abilities of self-evaluation and self-awareness. It is difficult to carry out such evaluation activities without detailed guidance of teachers. Teachers need to help students to understand the goals and requirements of learning, the main criteria of evaluation, and the main problems and methods of self-awareness. If necessary, teaches should also prepare some questions to help students find their own strong points and weaknesses. Enough time should be spent on relevant trainings and guidance needed by majority of students participating in this meaningful evaluation activity.

(d) The principle of comprehensiveness. The evaluation contents of ELP include the following points: whether new knowledge has been understood, mastered and applied; ability of independent study; ability of mutual cooperation with other students, innovation ability and so on. When assessing students' performance, teachers should conduct comprehensive evaluation based on the ability of their operation process, thought of solving problem and thinking quality through the reflection of work, personality and potential ability rather than make a simple conclusion to the work of students. Using these evaluation methods, the difference between good and bad works can be imagined, and the feelings of learners after listening to the evaluation of the teachers and the outcomes of the evaluation can also be imagined.

(e) The principle of individuality. Research on psychology and sociology shows that each student has different congenital quality, living environment, hobbies, advantages and weaknesses. Therefore, appropriate evaluation standards should be made based on recognizing the differences of individual student and respecting

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the needs and personality of each student. Individual evaluation of students helps students to ignite their passion for learning.

(f) The principle of motivation. In the process of evaluation, positive evaluation methods, such as creating a concrete vivid context and encourage and praise, should be used as much as possible by teachers. Positive feedback should be given to the students for progress they make in learning in order to allow students, especially those with relatively poor academic performance, experience the joy of achievement.

3.3 The Design of Portfolio Assessment

Firstly, the ELP type is confirmed. The ELP is divided into process portfolio, work portfolio, display portfolio and other types according to different research objects and functions to be archived. In the portfolio assessment, based on the learning status of students, teachers can also use appropriate teaching methods and benefit from improving the quality of teaching.

Secondly, the contents of the ELP are confirmed. The emphasis of different types of ELP is not the same, but the general purpose is to record the growth process of student learning. For college students, the records relevant information play an important role in promoting academic performance, career development and personal growth.

Finally, it is important to timely change and make self-assessment perfect, because most of the design and development is initially established from the view of faculty members without enough consideration of needs from the perspective of learners. Therefore, the ELP system must be updated and optimized for more effective teaching and learning process.

CONCLUSION

In the age of information today, ELP, as a new way of learning assessment, fully embodies the theory of multiple intelligences, promotes the personalized development of the students, and has broad prospects for development. However, only a relatively small number of 150 articles published in the past 15 years can be found in the CNKI database (Dai & Jiang, 2016), and most of these studies were based on experience and knowledge from western countries and focused mainly on the establishment of very basic ELP frame, methods, and strategies. The ELP-

related research is still in preliminary stage and not mature enough in China (e.g. the lack of theoretical depth and systematic scientific research).

There is no perfect assessment model, and it is unrealistic to expect the portfolio assessment alone can completely change the assessment of online education. The major focus of the current study is maximizing the function of ELP. We suggest the ELP be fully practiced by teachers and students and applied for the evaluation of teaching-learning process. In the follow-up work, some mathematical algorithms should be developed for data mining and analysis on ELP to extract quantifiable information, in order to broaden and deepen the research on learning assessment.

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