

Designing a developmental evaluation system for a network teaching platform

Dan Li, Xin Xu, Yan-shuang Li & Yuan Wang

North China University of Science and Technology
Hebei, People's Republic of China

ABSTRACT: There has been a transformation of the teaching systems of institutions of higher learning, as a result of the introduction of network teaching platforms. These platforms support curriculum resources and study activities. In terms of learning evaluation, the platforms provide simple functions without meeting the more comprehensive requirements for evaluation. Design elements for a developmental evaluation system for a network teaching platform and general principles of design are put forward in this study. A system based on these elements was designed, so as to support comprehensive developmental evaluations.

INTRODUCTION

Network teaching platforms of curriculum resources are widely used in colleges and universities to support study. Besides supporting classroom teaching, teachers share teaching resources on education platforms, with students, to carry out diverse activities, such as investigations, assignment of homework, Q&As and quizzes. This provides easier access for students in their study and for teachers in their management of a course [1-3]. Study using network teaching platforms has become an irreplaceable part of learning.

Network teaching platforms commonly used by institutions of higher learning include Blackboard, Moodle and Sakai. These tools can be used to manage teaching resources and to organise interactive activities, such as chats, discussions and Wikis. These platforms play an important role in homework assignment and quizzes, and can calculate the weighted grades of homework and quizzes, as part of a final course grade. In addition, Sakai provides e-portfolio functions by which students can specify format and style, share information and receive remarks back. Moodle records very detailed information about students' access logs, so that curriculum activities can be viewed by user, time, activity and movement. Blackboard can count the daily or monthly visiting traffic for a student by module. However, deficiencies still exist for these platforms. For example, the e-portfolio has few connections to other modules and so it cannot reflect students' activities with these platforms. Though students' access log information is recorded in detail by Moodle and Blackboard, these data cannot be used as assessment indicators.

Network teaching platforms provide sound support for homework, quizzes and other evaluation methods, and have made some attempt to support new evaluation methods, such as e-portfolios. On the whole, homework and quizzes remain the main part of evaluation by network teaching platforms. Homework and examinations are still the popular evaluation methods adopted by institutions of higher learning. Network teaching platforms pay little attention to the study process, are limited in their evaluation methods, and attach insufficient importance to students' all-round development. Based upon contemporary evaluation concepts, a model for an evaluation system for network teaching platforms and a detailed implementation approach is proposed.

CRITERIA FOR AN EVALUATION SYSTEM FOR A NETWORK TEACHING PLATFORM

An evaluation system for a network teaching platform should have the following characteristics [4]:

- Diverse evaluation:

Developmental evaluation should have diverse content so as to evaluate various aspects of a student's development. An evaluation system should support teachers and have various evaluation dimensions.

An evaluation dimension combines an evaluation objective with evaluation content and is activity- or internally oriented. Evaluation dimensions can be established according to external manifestations, such as discussions, Q&As, use of resources, homework and examinations, where the evaluation dimension is activity-oriented. Similarly, evaluation dimensions can be established according to a learner's internal condition, such as knowledge acquisition, ability or attitude. An activity-oriented evaluation dimension is easier to observe than an internal evaluation dimension, which reflects a learner's internal status. Developmental evaluation is a value judgement based on teaching goals. Evaluation dimensions are established according to knowledge, ability and attitude, reflecting teaching goals and human characteristics.

- Comprehensive information:

The system should reflect students' all-round development and pay attention to all aspects of study. Traditionally, teachers communicate with students in class, with the teacher as speaker and the students as listeners. However, students spend most of their time out of class and so teachers have difficulty understanding how students actually study. Network teaching platforms provide a new studying venue on which student activities can be recorded and teachers can learn about how students study. The network teaching platform should automatically record students' interactions, Q&As, use of resources, homework and examinations [5]. The system should gather procedural data on a student's study, to support evaluation of the student. As to students' offline learning, these platforms should also provide questionnaires and other tools.

- Multiple evaluation tools:

The study process is a source of evaluative information, while a student's engagement with various study activities is the source of procedural information. Study activities include browsing teaching materials and focused discussions. Teachers need to examine students' knowledge, ability and attitude by designing evaluation programmes. For example, students need to be examined on the mastery of knowledge from learning materials, using tests. Homework can be a measure of how well students can apply knowledge. Quizzes and homework reflect the results of study. To learn about students' study, many evaluation programmes and tools are needed. For instance, whether a student's attitude is positive can be seen through the degree of the student's interaction with the platforms. A student's performance can be examined through questionnaires. Evaluation tools, including homework and quizzes, on a network teaching platform, are mature. These tools use quantitative evaluation methods and present only final results, which is a limitation. The introduction of emerging evaluation tools, such as *gauge* and *e-portfolio* can make up for this deficiency.

Gauge has a series of evaluation criteria for students' performances, including their behaviour, recognition of taught content, attitude and diverse study results, such as work outcomes, oral presentation, dissertation and research report [6]. Gauge has multiple dimensions, each with multiple levels, for which each has a detailed description. The use of gauge can provide criteria required to become an excellent, high-quality student and, hence, make them more oriented to their study. Gauge can evaluate a student's work and study, both on on-line platforms and offline.

The e-portfolio includes students' personal information, school work, study activities and remark information. The goal of e-portfolio is to provide for teachers and students a complete study file.

- Self- and mutual-evaluation:

The network teaching platform can allow students to become evaluators of other students' performance. For example, students can evaluate each other's portfolios. To motivate students to engage in mutual- and self-evaluation, platforms can automatically record the frequency of students' evaluations.

- Multiple feedback modes:

Feedback modes and evaluation methods usually are closely linked. The forms of feedback can be determined by the various evaluation programmes and tools. For instance, right/wrong for a quiz; a remark for a project, a score or grade for work. The feedback can be according to the standards and grades appearing on gauge, as to the student's performance. Besides the commonly used feedback modes, such as score, grade or remark, student activity records on these platforms can be statistically processed to produce graphic feedback.

DESIGN OF THE EVALUATION SYSTEM FOR A NETWORK TEACHING PLATFORM

Principles of the Evaluation System

The above elements are necessary for an evaluation system reflecting present evaluation idea, but are far from enough. The evaluation system needs to be organised in a coherent way based on the following principles:

- Systematisation:

According to system theory, a system has a number of characteristics, viz. it includes several elements; interaction exists among the elements, the elements have an organisational structure and elements co-operate to deliver the system functions.

The structural elements of an evaluation system have been discussed. Achieving the system functions, such as diagnosis, regulation, feedback and motivation, requires that elements are organised and interact. The organisational structure of the system should be based on the procedures of the evaluation. Generally speaking, these procedures include preparation, implementation, processing and feedback. In the preparation phase, teachers design evaluation content and evaluation tasks, as well as preparing evaluation tools.

In the implementation phase, students engage in study activities and complete the evaluation tasks, such as quizzes and the submission of work. In the processing phase, teachers and students participate in the evaluation process, based on the student’s study. In the feedback phase, results from the processing phase are presented. So, it can be seen that each phase has its own function, and teachers and students in each phase have different tasks. When designing an evaluation system, consideration should be given to the periodicity of evaluation and ensuring that each element works optimally.

- Combine evaluation and teaching:

Developmental evaluation is not just a little part of the teaching process, which occurs upon the completion of study. Rather it must be integrated into each part of the teaching throughout the teaching process. The process of students’ engagement in study is a process of the accumulation of evaluation bases. As students browse study resources or participate in activities, such as discussion and communications, the relevant records of the study process accumulate and these records are the basis for evaluation. In addition, the implementation of an evaluation programme can urge students to study, and the feedback from the evaluation can be conducive to students’ improvement. Students’ involvement in self-evaluation and mutual-evaluation can make them reflect on their own learning. Evaluation that is both periodical and timely can guide students toward improvement.

Design of the Evaluation System

Given the above considerations, the proposed architecture for a developmental evaluation system for a network teaching platform is shown in Figure 1.

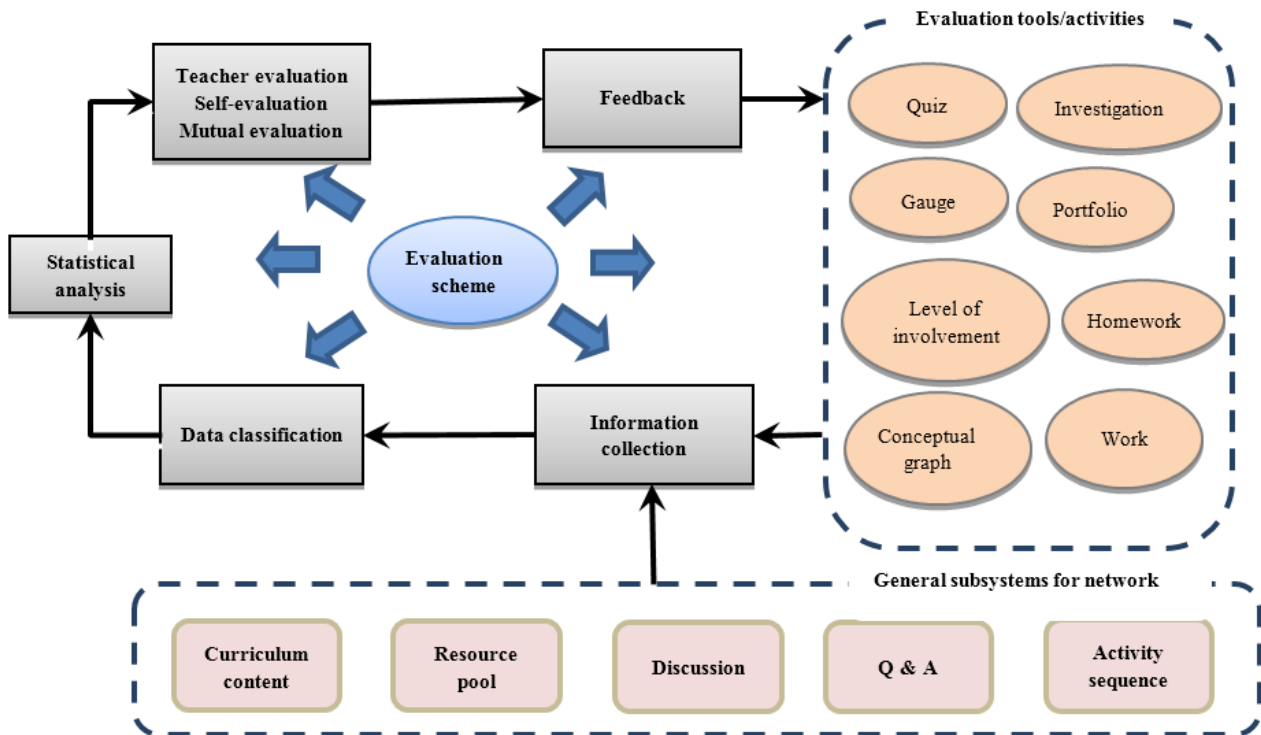


Figure 1: Architecture for a developmental evaluation system for a network teaching platform.

This system is closely linked into the original network teaching platform. It gathers student procedural information about their study of on-line courses, utilisation of resources, discussion, Q&A and general involvement in study activities. The system enlarges on and improves the original evaluation tools, so as to develop into evaluation tools with multiple functions.

Operation of the Evaluation System

The information in the evaluation system originates from students' study and various evaluation activities. The core of the evaluation system is the evaluation scheme, which determines the information to gather; the tools to use and the feedback. Feedback concerns system operation information as input to evaluation programmes and, then, presented to learners. Figure 2 shows each phase of the evaluation, i.e. the preparation, implementation and processing, as well as the feedback.

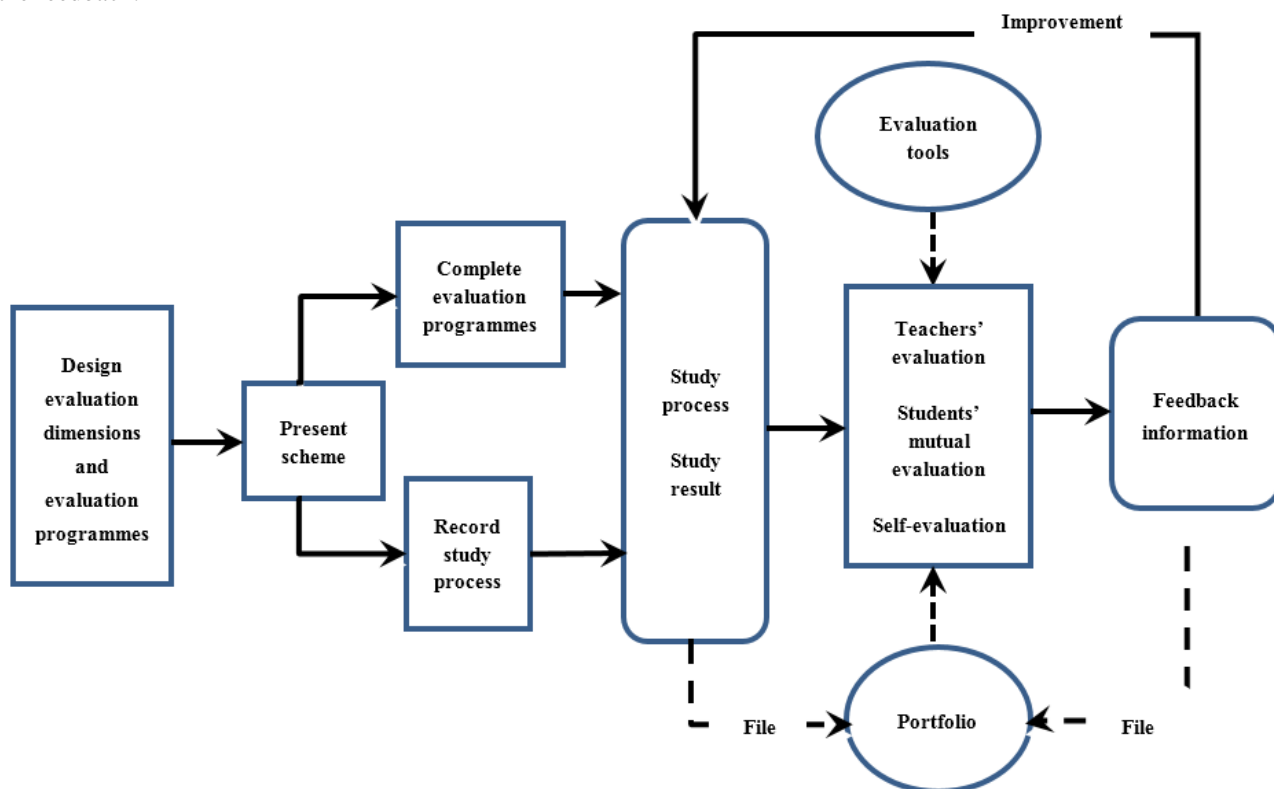


Figure 2: Processing for the developmental evaluation system.

In the preparation phase of the evaluation, teachers establish evaluation dimensions, develop teaching goals and produce an overall plan for the evaluation. The system allows dimensions, such as knowledge, ability and attitude based on learners instead of learning activities. Teachers can delete or add dimensions according to their own demands. Each dimension must include the content of the evaluation and its relationship to teaching goals. Of course, specific evaluation programmes need to be added and the evaluation tools prepared. This is the core of the evaluation.

The system will provide a selection of evaluation programmes and tools for the teachers. Each programme or tool has its own evaluation dimension. For example, the conceptual graph is a good measure for evaluating the mastery of knowledge. Students' ability to apply knowledge can be examined through their work. A programme needs to specify whether to allow mutual evaluation and set the relative weight for teacher and student ratings.

The degree of a student's interaction with the platform can reflect their attitude. When setting the *interaction degree* teachers should decide what needs to be examined, e.g. task completion, login frequency, download frequency of resources, contributions, postings, quantity of learning notes and involvement in evaluation. Each programme must stipulate the score a student obtains for meeting the requirements.

At the beginning of teaching, the students will be presented with the evaluation scheme, so they clearly understand the success criteria. Then, students start to browse study resources, participate in study activities, complete stipulated quizzes, submit study results, and so on. The system will automatically record student activity on the platform.

Information Gathered for the Evaluation

Relevant information about the study process and results form the basis of the evaluation is gathered. Specifically, this information is of three types:

- Study results submitted by students, such as quizzes, homework, work and conceptual graphs.
- Information automatically recorded by the platform.
- Students' performance based on observations.

To support these three kinds of information gathering, the system needs to provide diverse evaluation methods. For study results, marking and written remarks are the normal means of evaluation. Here, the gauge can make the evaluation more convincing. For procedural information, the system automatically can calculate a student's grade based on the interaction degree stipulated in the evaluation scheme. For more active students, teachers can award extra points as a reward. Compared to the first two types of information, the observations appear to be abstract, so often they are illuminated through a series of questions that indicate the required standard. When evaluating by work, portfolio and gauge, students can act as the evaluators. For instance, when evaluating work, a teacher can share the submitted work with the class, and allow students to engage in the marking. Hence, evaluation activities can involve the teacher, classmates or the students themselves.

Evaluation Feedback

Statistics from the system about the study process can be developed into diverse feedback information, such as grades, remarks, guidance and graphs. The system can produce individual periodical evaluation reports as a reference for teachers and students. The evaluation report includes the specific student's accomplishment, and the degree of a student's involvement with the network teaching platform. In addition, the system can present a student's performance by each dimension in the form of a map, such as shown in Figure 3. Through a comparison of each dimension in terms of score and ranking, students' strengths and deficiencies can be shown clearly, which identifies areas for improvement.

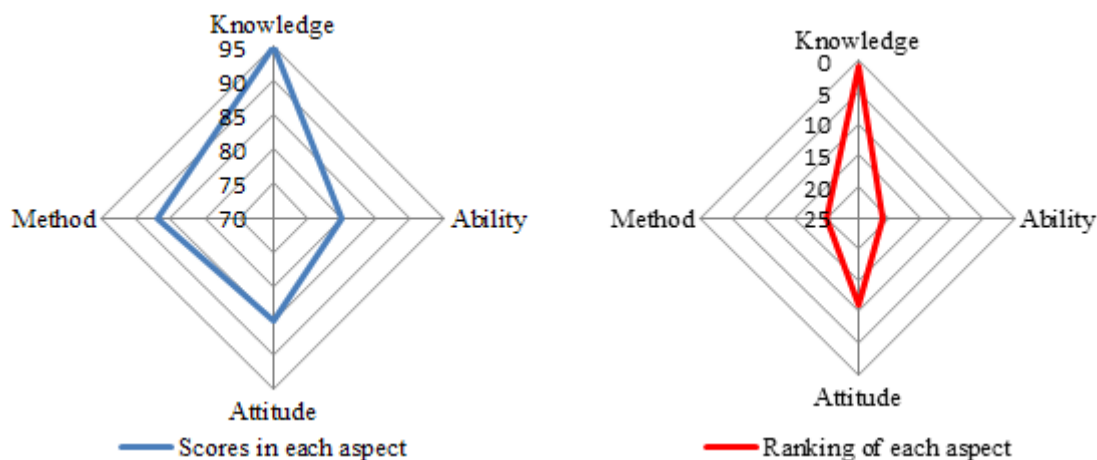


Figure 3: Structural graphs for knowledge and ability.

Students' results, study process and evaluations can be incorporated into an e-portfolio. This will include multiple modes of evaluation, so that teachers can be informed about the whole process of a student's study. In addition, further evaluation activities can be carried out based on the e-portfolio.

Teachers can design evaluation schemes with major teaching chapters or teaching themes as teaching units. They can make the evaluation periodic, say, three or four times per term. Thus, comprehensive evaluation dimensions can be included in every evaluation phase, and evaluation results for each phase can guide the study in the next phase.

CONCLUSION

A developmental evaluation system for a network teaching platform can guide and support teachers in conducting comprehensive evaluations of multiple dimensions of study. The system provides for the collection of procedural information, for multiple evaluation methods, and with the participation of multiple evaluators. The network teaching platform can act as a support, both in tools and environments, for the implementation of the evaluation system [7]. For evaluation to promote students' development, it is necessary for teachers to meticulously design the evaluation scheme. The evaluation system allows teachers to pay attention and provide guidance to students in their studies.

REFERENCES

1. Liu, Z. and Wu, Y., Design of a university aerobics teaching network information platform (ATNIP). *World Trans. on Engng. and Technol. Educ.*, 13, 1, 34-37 (2015).
2. Sun, J., Construction of a sports experimental teaching system. *World Trans. on Engng. and Technol. Educ.*, 12, 4, 690-693 (2014).
3. Liu, G., Zhang, Y. and Fan, H., Design and development of a collaborative learning platform supporting flipped classroom. *World Trans. on Engng. and Technol. Educ.*, 11, 2, 82-87 (2013).
4. Liu, Y., The system design of the network teaching platform of learning based on the concept of development evaluation. *Frontier and Future Develop. of Infor. Technol. in Medicine and Educ.*, 1241-1245. Springer Netherlands, (2014).

5. Wang, K., *Developmental and School-based Study on Student's Evaluation*. Shanghai: ECNU Press (2009).
6. Yu, S.G., Distance education evaluation mode based on Internet. *Open Educational Research*, 1, 33-37 (2003).
7. Sun, Y. and Li, T., Research and design of the teaching evaluation system for teaching platform of network information security. *The Science Educ. Article Collects*, 4, 50 (2013).