In-Process Quantitative Evaluation for Network-Based Learning

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Abstract. This paper analyses the features of quantitative evaluation in network-based teaching, introduces an in-process quantitative evaluation model for intelligent network-based teaching, and discuss its implementation and performance in the Yuanlin intelligent network-based teaching system.

1 Introduction

Network-based education is developing surprisingly as information technology advances rapidly. Increasingly, we are facing the use of the Internet as an aid to learning (Oliver & Omari, 1999) [1]. It has become a challenge to traditional school education (Stephenson, 2001) [2]. Network technology will be an important tool for educational reform and development worldwide. As is mentioned in Outline of Curricula Reform of Elementary Education promulgated by the Chinese Education Ministry, we must promote the popularity of information technology in teaching practice and realize the integration of information technology into curricula; we must change teachers’ pedagogic methods and the way of presenting teaching contents, the way of learners’ studying, and the way of interacting between learners and teachers, and provide learners with various education circumstances and helpful learning tools.

Network-based education systems need be intelligent in order to meet the above requirements. Current network-based education systems worldwide, however, are far from being intelligent. They cannot meet learners’ requirements of efficient and independent learning online (Chao, 2002) [3]. Online evaluation and assessment should be part of the learning-teaching process, embedded in student activities and in the inter-

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actions between learners and teachers (Harasim et al, 1996) [4]. Evaluation involves judging the effectiveness and worth of programs and products (Reeves, 2002) [5]. In fact, vendors, designers and instructors appear to struggle with conceiving of evaluation as anything more than a multiple-choice test (Angelo & Cross, 1993) [6]. With regard to measurement, evaluation and feedback of learning online, almost all existing systems adopt some sort of terminative evaluation. They often include a database with considerable contents for test and items may be chosen from the database according to certain principles to compile test papers and implement grading or scoring methods. Terminative evaluation cannot provide with timely feedback. Specifically, they can neither provide with quantitative feedback betimes on the gap between a learner’s goal and the progress and quality of his/her present learning, nor point out what causes difficulties to the learner and how to overcome them. Besides, there is a common problem in existing network-based teaching systems: they are unable to provide learners at different learning levels with different teaching methods and advices, unable to efficiently help learners who have different learning goals, abilities and starting-points. According to Bloom’s view (Bloom, 1973) [7], The main reason why many learners do not achieve excellent academic performance is not because of their lack of intelligence, but the absence of appropriate teaching circumstance and reasonable helps. If we provide with good learning environment, most learners will become quite similar on learning abilities, progress and motives for further study. Here learning environment includes individual instructions.

The network-based teaching systems should focus on providing learners at different learning level with this kind of learning environment as much as possible. The precondition of achieving this objective is to develop an effective quantitative evaluation model for network-based teaching that not only provide exams at end of learning, but also evaluates learners’ performance during the process of learning.

When designing intelligent network-based courses, the designers should keep in mind such matters as below. The first is how to provide learners with timely and quantitative feedback about the gap between a learner’s goal and current learning. The second is how to automatically analyze and detect learners’ difficulties of learning, as an excellent teacher provides students with individual instructions. Network-based courses should be able to inform learners of why they cannot master the knowledge in the course. For an instance, the reason is whether a learner does not know related knowledge, or the learner does not understand new knowledge; whether a learner can understand new knowledge but unable to remember them, or the learner can understand and remember new knowledge but cannot use them skillfully; whether a learner can understand and skillfully use new knowledge but the knowledge has not been instantiated nor generalized by the learner, or the learner can meet all the above requirements but lack strategies to apply the knowledge flexibly. The third is that network-based teaching system should be able to choose pertinent pedagogy methods automatically, to provide learners with advices and feedback on learners’ goals. For a student whose goal is to go to top-ranking universities, the system can judge the appropriateness of the learner’s goal and give some suggestion. For example, the suggestion may be that your present goal is too higher and you may suffer excessive diffi-