Chapter 11
An Extenics-Based Learning Performance Evaluation Scheme in Distance Learning

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ABSTRACT
In recent years, Web-based learning has become one of the major applications of the Internet. For Web-based learning, it is important to design an intelligent curriculum Website for students and to make teachers understand the learning situation of each student in order to provide adequate auxiliary learning materials to individual students. Seven factors, including learning behaviors, were assumed to affect the learning performance of students. These assumptions have been analyzed to determine their effectiveness, and five factors, the degree of interest in the course, the degree of the familiarity with the computer, the number of Web pages browsed, the length of the course content, and the degree of difficulty of the course content are selected for evaluating the learning performance of students. In the research, a Moodle-based curriculum Website was established as the experimental platform to record students’ learning behaviors for analysis. By applying the extenics engineering method, a learning performance evaluation scheme is proposed to generate an evaluated learning performance of individual students for instructors’ reference. Thus, according to the evaluated learning performance, instructors can provide students with more adequate learning materials in accordance with individual students’ learning performance.

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INTRODUCTION

The use of web-based instructional systems or e-learning systems has grown exponentially in recent years (Brusilovsky, & Peylo, 2003), and researchers have begun to apply data mining methods to help instructors, courseware authors, etc. to improve e-learning systems (Mostow, & Beck, 2006). By applying web-based instruction, the time-space limitation can be eliminated and both a wide range of teaching materials as well as individualized teaching methods can be provided (Leung, 2003). Well-designed web-based instruction can aid effective study, reduce the learning period, promote the learning efficiency, and improve the learning attitude of students (Baker, Hale, & Gifford, 1997). To meet the current information society, teachers should have the ability to apply these techniques effectively in their teaching to improve students’ learning efficiency and to train students to apply the information effectively themselves (Shick, 1996).

Personalizing information has been the motivation behind developing e-learning systems for a long time (Marković, Jovanović, Jovanović, Jevremović, & Popović, 2010). In the classroom we can find that even providing students with the same teaching materials will result in different learning performances for different students. According to the learning performance of students, teachers can adjust the teaching materials in class. Similarly, an on-line learning system should have this function. In order to adjust the teaching materials to different students according to their learning performance in the on-line learning system, it is necessary to study the on-line learning behaviors of the students, such as browsing behaviors and the number of web pages browsed, as well as the effect different browsing behaviors have on their learning performance.

The extenics theory was proposed to solve the incompatible problem through the systematic transformation and has been applied to many research fields, including education (Cai, 1983; Liang, & Xi, 2009). In this research, the extenics engineering method has been adopted to build an extenics associative function to evaluate the learning performance of individual students. According to the evaluated learning performance, instructors can provide students with more adequate learning materials to match each individual student’s learning needs.

For web-based learning, it is important to design an intelligent curriculum website for students and to make teachers understand the learning situation of each student in order to provide adequate auxiliary learning materials to individual students. A Moodle-based instructional system has been used as the experimental platform in our research, since it is freeware, making it both sharable and suitable for studying web-based instructional systems. We expect to use an on-line learning system to collect data on on-line learning behaviors of students for analyzing and finding out the factors that affect learning performance, which will then be applied to the extenics theory to evaluate the learning performance of students.