

Chapter 3.34

Evaluating the Learning Effectiveness of Using Web-Based Instruction: An Individual Differences Approach

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ABSTRACT

The use of Web-based instruction is becoming widespread in higher education; however, much remains to be learned about how different learners react to such instructional programs. The study presented in this chapter evaluates students' learning performance and their perceptions in a Web-based instructional program, which was applied to teach students how to use HTML in Brunel University's Department of Information Systems and Computing. Sixty-one master's students participated in this study. A number of interesting interactions were found. Students' task achievements were affected by the levels of their previous system experience. On the other hand, the post-test and gain scores were positively

influenced by their perceptions and attitudes toward the Web-based instructional program. The implications of these findings are discussed.

INTRODUCTION

Due to the popularity of the World Wide Web (Web), there has been a considerable growth in the use of Web-based instruction. Bonk et al. (2001) stated that no technology has so rapidly become prominent in educational settings as the Web-based instruction. From educational insights, Web-based instruction seems to provide answers to problems confronted by traditional teaching in higher education, such as large class (Freeman, 1997), and students from disperse locations (Dede,

1996). However, the drawback is that Web-based instruction employs hypermedia techniques to present information in a non-linear format. On the one hand, non-linear interaction provides learners some control over the instruction. On the other hand, the responsibility for designing learning paths becomes that of the students. Learners have to decide in what order the topics will be accessed (Sweany et al., 1996).

If learners lack such a skill, their performance may be hindered; in turn, they may have more negative attitudes toward using Web-based instruction programs (Dringus, 2000). It suggests that the use of the Web-based instruction may not improve learning effectiveness (Cummings, Bonk & Jacobs, 2002), and individual differences are critical factors for the successful use of Web-based instruction programs (Chen, 2002). However, there is little empirical evidence of the learning effectiveness of Web-based instruction (Bork, 2001). Therefore, many more empirical studies are needed, because such evaluation can provide concrete prescriptions for improving the design of Web-based instruction. In this vein, the study reported in this chapter aims to investigate how individual differences influence students' learning effectiveness within a Web-based instruction program.

The chapter begins by building a theoretical framework to present the relationships between Web-based instructional programs and individual differences. It then progresses to describe an empirical study of students' learning experiences in a Web-based instructional program. Subsequently, the design implications are discussed based on the findings of this empirical study.

THEORETICAL FRAMEWORK

Web-Based Instruction

Web-based instruction provides a revolutionary educational environment (Brooks, 1997), and it is

increasingly being used to deliver course content in higher education (Nachmias & Segev, 2003). Perhaps the most obvious advantages perceived by the students are dynamic interaction and flexible schedule. In terms of dynamic interaction, the Web-based instruction presents an enormous amount of information through various interconnections that offer students a rich exploration environment. The development of Web-based instruction provides learners with many opportunities to explore, discover, and learn in theory according to their own individual needs. Students can create individualized learning paths to reach the desired goals, move at their own speed and retrieve additional information as needed (Hui & Cheung, 1999). There is a shift away from didactic instruction to discovery of information (Smaldino, 1999). This approach is in line with the constructivist philosophy of learning where the learner is encouraged to interact with the environment to construct individual knowledge structure (MacDonald et al., 2001).

With regard to flexible schedule, Web-based instruction allows learners to read course content through a computer network at any time and at different places (Chang et al., 1998). Burton and Goldsmith (2002) found that such flexible schedule makes Web-based instruction appealing to the students, including the convenience of not having to be on campus during the week, ease of arranging personal commitments, and ability to take courses around work schedules. This type of learning may be particularly beneficial to individuals who live in remote places (Daugherty, 1998). The individuals living in remote areas can have access to the same course content as those living in big cities. This is the reason why many educators have tried to develop a distance-learning program on the Web. As pointed by Clark and Lyon (1999), the Web-based instruction has been predicted to be the future of all types of distance learning programs.

However, these advantages may come with a price. Power and Roth (1999) reported that the

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