Development and Testing of New E-Learning Hypermedia System

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ABSTRACT

Adaptive E-learning Hypermedia Systems (AEHS) are an innovative approach to a web learning experience delivery. They try to solve main shortcomings of classical hypermedia e-learning applications: “one-size-fits-all” approach and “lost-in-hyperspace” phenomena by adapting the learning content and its presentation to needs, goals, thinking styles and learning styles of every individual learner. This paper outlines a new approach to automatically detect learner’s thinking and learning styles, and taking into account that thinking and learning styles may change during the learning process in an unexpected and unpredictable way. The authors’ approach is based on the Felder Learning Styles Model and Hermann thinking styles model.

Keywords: Adaptive E-Learning Hypermedia System, Felder-Silverman’s Theory, Genetic Algorithm, Learning Style, Thinking Style

1. INTRODUCTION

A distinct feature of an (AEHS) is the learner model it employs, that is, a representation of information about an individual learner (De Bra et al., 2004; Henze and Nejdl, 2004). Learner modeling and adaptation are strongly correlated, in the sense that the amount and nature of the information represented in the learner model depend largely on the kind of adaptation effect that the system has to deliver. In fact, we see a problem arising when teachers assume similar learning styles, thinking styles, levels of knowledge and abilities for learners (Ruiz et al, 2008). This is because learners that are less able will feel that it is too difficult for them to follow and those that are more capable will feel as though the learning method is too easy. Teachers can adjust the standards; however, there may be conflicts between learners with varied styles. Thinking style, learning style, level of knowledge, preferences and ability of learner are part of learner’s characteristics, which have significant influence on the activity of learners in the learning process. In this paper we have focused our attention on the learner model, which allows for the discovery of thinking and learning styles of learners that have access to an AEHS.

The paper has been structured as follows: The background knowledge on the research subject is given in section 2. In section 3, the proposed approach is explained. Some experimental results related to the subject area are analyzed in sections 4 and 5. Finally, the conclusion is given in section 6.

DOI: 10.4018/IJITWE.2015040101
2. RELATED WORK

In this study, the researchers would like to explore how personal thinking and learning styles could have effect on the learning achievements. There were two aspects of styles, one refers to how one prefer to learn something, and the other refers to how prefers to process the learning information. Some researchers categorized the former as learning style and the later as thinking style (Peterson, Rayner, & Armstrong, 2009). In this study, the researchers would like to explore how one’s thinking styles related their achievements. The were several major models of thinking styles, including the field-independent vs. field-dependent model (Witkin & Goodenough, 1981), the Myers-Briggs Type Indicator (MBTI) and Herrmann Brain Dominance (Herrmann, 1995). In this study, the researchers will identify the participants’ thinking style based on Herrmann Brain Dominance Model.

2.1. Thinking Styles Models

Each person thinks and behaves in preferred ways that are unique to each individual. These dominant thinking styles are the results of the native personality interacting with family, education, work, and social environments (Danielson et al., 2002; Cano-Garcia et al., 2000). People’s approaches to problem solving, creativity, and communicating with others are characterized by their thinking preferences (Harrison et al., 1984; jabolokow et al., 2000). For example, one person may carefully analyze a situation before making a rational, logical decision based on the available data. Another may see the same situation in a broader context and look for several alternatives. One person will use a very detailed, cautious, step-by-step procedure. Another has a need to talk the problem over with people and will solve the problem intuitively.

Thought processes have been studied since ancient history, several models have been proposed on how the human brain works. One of the well-known models is the Herrmann model (HBDI) (Bono, 1998; Haik, 2007; Bawaneh et al., 2011a; Bawaneh et al., 2010; Bawaneh et al., 2011b; Salmiza, 2010), which divides the brain into a four quadrant brain dominance model (see Table 1).

2.2. Learning Styles Models

The concept of learning style has a broad-meaning. In this research, it is proposed and defined as an individual’s preferential focus on different types of information; ways of perceiving the information and understanding the information (Li et al., 2008). “Learning Style” are categorized and developed by educational researchers to classify learners based on their customary approach to perceiving and processing information (Kolb., 1984). Educational research and practice have demonstrated that learning can be enhanced when the instructional process accommodates the various learning style of a student. (e.g. (Buch et al., 2001; Calver et al., 1999). The research argued that a student can learn efficiently, retain the information longer, apply the knowledge more effectively when their learning styles are consistent with teaching styles (Calver et al., 1999; Felder, 1993). A number of adaptive e-learning systems have been developed applying different learning style theories as well as Felder-Silverman’s Model (Lui, 2007). Those systems offer personalized content depending on the students’ learning styles, known as adaptive presentation. Felder Silveraman’s theory classifies learners into four different groups according to their preference in Sensing/Intuitive, Verbal/Visual, Active/Reflective, and Sequential/Global (Table 2).

In next section, we will elaborate the AEHS using Thinking and learning styles, a system through which users (learners, teachers) could take part in the construction of course structure, by adapting the pedagogical activities to their profiles.
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