

**Enhancing learning management systems
by using learning styles**

(Abstract)

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In the recent past the cost of computing devices and connectivity to the Internet has seen a gradual decrease, and as a result their use in education has grown rapidly. Likewise with internet connectivity being accessible for more people even on mobile platforms, face to face teaching and learning have been supplemented with e-learning. Learning Management Systems (LMSs) have often been considered as a solution platform for e-learning. This research studies the use of learning styles of learners to enhance LMSs.

Chapter 1 provides an introduction into the research topic, including the background to the research. Objectives and the scope of this research are explained. Further, this chapter gives an overall picture of the research ranging from theory through practice.

Chapter 2 provides an overview of previous research studies in related domains which lay the foundation background knowledge for this study. The use of LMSs in different forms has been popularized during the past 15 years, and they are used in educational establishments of different scales for different user categories. However, researchers have further highlighted that LMSs do have common limitations in adaptability or personalization. This chapter elaborates on the process involved in creating content for LMS with an emphasis on reusability.

When considering differences among learners, a characteristic that has been often mentioned in research is learning styles. This chapter further discusses several models forwarded by educational theorists to model learner behaviour. An in-depth study of the Felder-Silverman Learning Style Model (FSLSM) is carried out as it is one of the most cited models with respect to e-learning. Mappings formed between learner activities performed in an LMS and learning styles are presented. Since most LMSs use a database to store contents as well as user activities, a number of researchers have attempted to use data mining approaches to extract patterns from LMS log data. This chapter further investigates these activities, together with common software tools used for this purpose.

Chapter 3 presents a proposed framework for evaluating learning styles in an LMS. The framework adopts a modularized approach, which contains modules for automatically detecting learner's learning style, storing individual profiles, and recommending a content based on his/her learning style. Technical details of the implementation carried out using Moodle are also discussed. As very few researchers have attempted to study on the awareness of learners to the concept of learning styles and how they relate to each other, this research presents a novel learning style visualization scheme. Identified as a learning style map, it visualizes eight learning

preference characteristics corresponding to eight preferences of FSLSM. This visualization can even be used by instructors in their aim to understand learners better, as well as structure their content according to the learners.

Chapter 4 covers performance evaluations carried out to demonstrate the effectiveness of the proposed system. One experiment is to consider which algorithm is the best for predicting learning styles. The J48 decision tree algorithm was revealed as the one with the best performance for our dataset. Another investigation considers the performance of the scheme proposed in this research against similar experiments carried out previously by other researchers.

In Chapter 5, a summary of the findings is presented. This chapter also presents limitations of the approaches followed in this research, and possible remedies to solve them. The thesis concludes by providing insight into further research directions emerging out of this research.