

Exploring impact of cognitive style and modeling student learning using E-portfolios

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ABSTRACT

This Paper aims at cognitive modeling of student learning using E-Portfolios created by learners after accessing learning content prepared based on the learning styles of the learners. As the E-Portfolio is the creation of one's own learning, it will be possible to judge the cognitive style of the learner. The E-portfolio created is analyzed based on the cognitive modeling principles like knowledge tracing, model tracing and prototyping. The result can be used for career counseling and talent scouting. This project can support on-line education systems in judging the learning patterns of the learners and offering a self-evaluation.

KEY WORDS: portfolio, Cognitive Modeling, E-learning, Metacognition, Adaptive learning, Talent scouting.

1. INTRODUCTION

In present educational system, students are evaluated based on a common pattern which lacks personalization. In higher education, learners prefer personalized and self-evaluation learning system. To make learning process more efficient there was a need to model students based on their cognitive styles of learning (Dekson, 2015). Only by knowing the cognitive style of the learners the teaching learning process can be improved. Cognitive style or "thinking style" is a term used in cognitive psychology to describe the way individuals think, perceive and remember information (Norol Hamiza Zamzuri, 2010). Cognitive style is considered here as a static, relatively in-built, and fairly fixed characteristic of an individual. Individuals may vary their learning strategy or approach to learning as required, but the underlying cognitive style will remain fairly constant. As the cognitive style of every learner is unique it is important to analyze the process of knowledge assimilation by a learner. Today education around the world focuses on virtual learning environments, where courses are offered on-line and knowledge up-gradation is made easier for the working professionals. In such learning environments, the learners expect content to be more personalized and prefer self-assessment to develop on their learning. A conventional mode of evaluation will not suffice the self-learners.

This work aims at evaluating the e-portfolio created by the learner during the learning process. Thus carrying out cognitive modeling using E-Portfolio which contains the cognitive chunks of knowledge developed by the learner would be centered more on learning than on teaching processes, more on the protagonism of the learner as the person that generates knowledge than on the teaching activity. In general the digital portfolio may be understood as an online application that allows the management, organization and distribution of personal information relating to academic or professional life. This cognitive model would suffice for career guidance and serve as a base for talent scouting.

2. MATERIALS AND METHOS

Figure 1 illustrates E-portfolio architecture, where the learners access content and interact with faculty and the fellow learners and develop their own ideas and knowledge regarding the subject and save it into their portfolio for further reference.

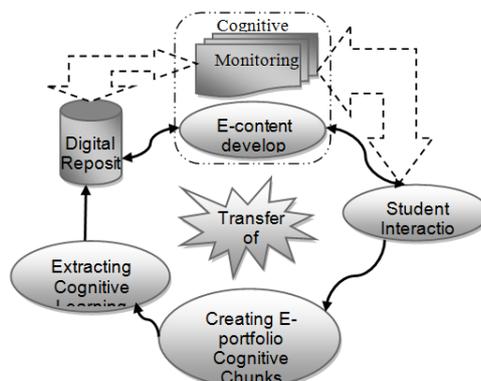


Figure.1. Structural view of Cognitive modeling of student learning

In brief the learners maintain a personal record of their learning process. The main operations the learners can perform during the learning process are creation of digital traces such as writings, images, multimedia files, blogs and other reflections over the time of learning. These traces can be part of the process of learning (how and what they have learnt), an end-product or an outcome of learning, which can be used for assessment and validation

purposes. These digital traces of learning can also be called digital knowledge artifacts i.e., any process or object resulting from human activity. In whatever manner digital portfolio or e-portfolio is understood, nowadays we talk about it as something that learners can carry along all throughout their life as they move from one educational level to another or progress in their working carrier.

The learners after learning a course are asked to create an e-portfolio. The structure of the e-portfolio is given in a format to make evaluation easy. This contains the key words, definitions, summary, a mind map and a context oriented application. This enables to judge the skills gained by the learners. A self-test system will also be added to take a test after each learning session. This test will be organized at various levels to test the knowledge level. The test scores also will be considered for modeling the learner. This will offer a suggestive method for the learning process. Principles such as model tracing and knowledge tracing employing statistical models will be performed on the portfolio to obtain the cognitive model.

3. RESULTS AND DISCUSSION

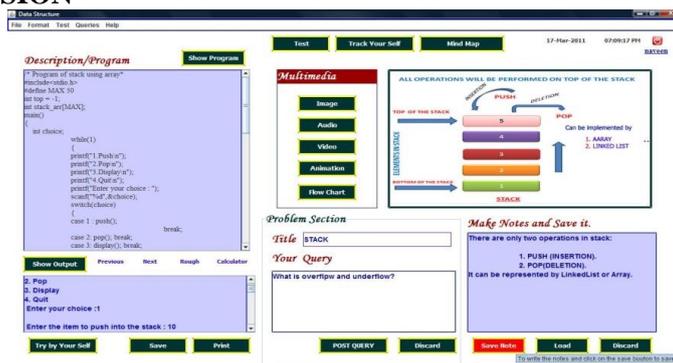


Figure. 2. Adaptive learning environments created to test the contents

Figure.2 shows the snapshot of an adaptive learning platform developed during the research work, which offers adaptive content and tested the learner's preference for the personalized content. It had a good response during the survey conducted among the novice learners. This used the VARK learning style model (Somayeh Moazeni 2013) to offer the contents. The VARK is a multi-sensory approach consisting of Video, Audio, Reading (Text) and Kinesthetic achieved by animations. The learner has a choice to select from the variants of contents.

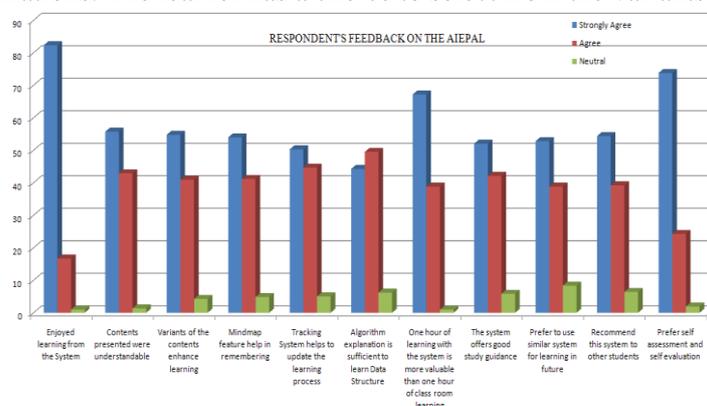


Figure.3. Respondents Feedback of the Adaptive learning system

The response of the learners after using the system is shown in the bar diagram (Figure.3) from a sample size of 540 students. The diagram also shows the various features on which the system was validated. The next level of the system will be to perform modeling of the learners and offer counseling on the learning process and career guidance to make the process complete.

4. CONCLUSION

In this work a learning platform is developed where the learner selects a particular course and can select the type of content. This content is prepared based on the learning styles of the learner. The VARK learning style model and the Felder- Silverman Learning style index (Silvia Rita Viola 2006) is used for developing the content. The content is developed by employing multimedia tools. After a learning session, the learner is asked to prepare a portfolio based on the knowledge gained. The structure of the E-Portfolio is given such that an automated evaluation can be carried out based on the cognitive chunks of knowledge developed by the learner. The learning platform developed employs Blooms taxonomy (Prakash Ranganathan, 2010) in advancing knowledge of the learner to apply the skills and fulfill the learning process.

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