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Adaptation of Aura Colour Interface Content Presentation based on Learner's Emotion in Personal eLearning Environment using Production Rules

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Highlights: Personalization is a suitable approach to adapt the learner to its learning environment. Adaptation for personalization is based on modality and affective aspects of the learner. Most research into adaptation is focusing on modality aspect, thus adaptation in affective aspect is crucial to be explored. This innovative prototype namely, *EmoAPeL* was developed to adapt the aura colour interface content presentation based on learner's emotion in Personal e-Learning Environment using an intelligent production rule. *EmoAPeL* has been tested to 30 Universiti Malaysia Pahang students. The mean results show 88.5% of the students agreed that *EmoAPeL* motivates their inclusive learning environment. EmoAPeL development concept can be embedded to any eLearning systems.

Key words: Personalization, Personal Learning Environment, Emotion Adaptation, Production Rule

Introduction

Each learner has different characteristics, preference, learning style and emotions. These differences make *one size fits all* concepts in eLearning is not relevant anymore. Adaptation in Personal Learning Environment (PLE) solves the problem, where the learners have to accept what have been given or deliver to them without considering their differences. The concept of PLEs refers to the environment that each person constructs in order to manage, build and exchange information and knowledge (van Harmelen, M., 2006; Atwell, 2007; EDUCAUSE, 2009) embedding the adaptation in PLE will make the more efficient and interesting learning environment to the learner. Adaptive learning is a system of learning that customizes the structure of learning contents to the desire for the individual learners. Nowadays, the system is said to be modeling the learners base on their personalization. This concept has the high potential to provide individual learners with the best-personalized learning experiences while studying using eLearning (Sonwalker, 2013). There are a few adaptation types such as a context-aware system, which adapted the presentation of the content. Content was presented in a variety of ways based on both students prior competencies (pre-requisite knowledge and skills) and preferences (Glushkova, 2008). The combination of these two aspects will enhance the learner's interests and motivation to eLearning. The objective of this innovative project is to identify the personalization based on student's emotion, to embed the adaptive based on emotion in the developed prototype for adaptive based learning and to test the effectiveness of the developed prototype in enhancing learner learning motivation and acceptance among IHL's students.

EmoAPeL Development Framework

Emotion Adaptive Personal Learning Environment (EmoAPeL) is developed through the combination of Aura Colour Based Content Presentation and Production Rules Intelligent Technique. Aura Colour Based Content Presentation is used to develop the content in the Multimedia Technology Application subject. Mir Hazil (2010) identified the emotions could be relieved by using the colour aura. Sad emotion can be ease with the design of an interface that has lots of green colour. The green colour will stimulate the emotion to feel happy and be in neutral environment. Furthermore, for happy emotion, the interface must have lots of pink colour. This is because the pink colour will sustain the happy emotion. Recommended for the angry emotion, the design should have lots of blue colour. The blue colour will ease the angry emotion. In order to adapt the emotion to the content, the researcher used production rules. The process of EmoAPeL is simplified in Table 1.

Table 1   Simplified table for Emotion, Aura Colour and Production Rules

Emotion	Main Colour to ease emotion	Production Rules
Sad	Green	**IF** learner clicks sad emoticons **THEN** change to sad presentation **ELSE** Display existing presentation
Happy	Pink	**IF** learner clicks sad emoticons **THEN** change to sad presentation **ELSE** Display existing presentation
Angry	Blue	**IF** learner clicks sad emoticons **THEN** change to sad presentation **ELSE** Display existing presentation

Figure 1 shows the flows where EmoAPeL starts by detecting the emotion respond from the learners. The production rules which match colour aura will ease the student emotion, and this will lead to enhancing the interest towards the subject content that shown in adaptive Personal eLearning Environment application.
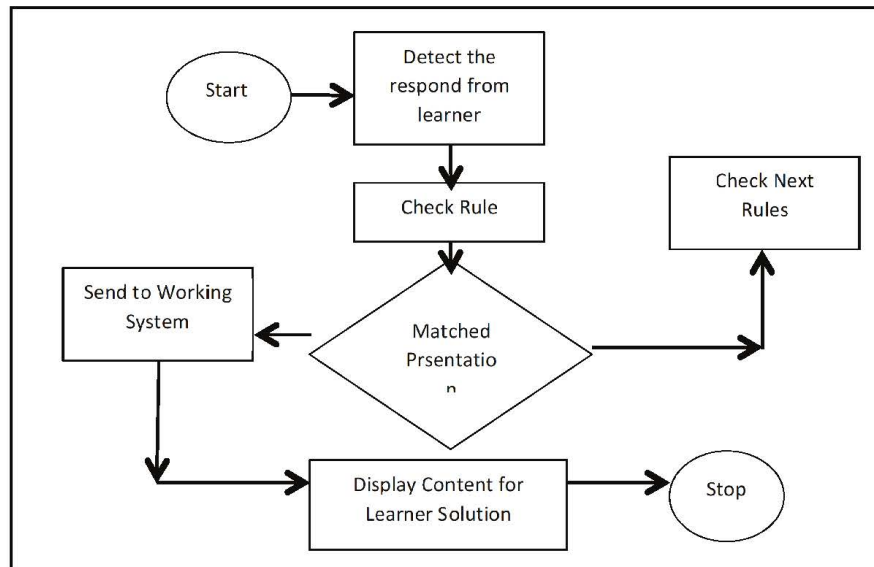

Figure 1 : EmoAPeL Flow Diagram

The adaptive technology based on emotions can help the learner to perceive the knowledge easily. The capability of color aura can ease the learner's emotion and makes their acceptance of learning smoothly without any distraction from negative emotions (Rahmah & Nor Azan, 2016).

Result and Dicussion
Multimedia Technology Application subject is selected as representing EmoAPeL. The testing has been made to 30 students from Faculty of Computer Systems and Software Engineering, Universiti Malaysia Pahang. A set of the questionnaire is given to the students during the test. The results show 87% of the students agree that EmoAPEL can ease their emotions, and 90% agree of their understanding towards the subjects.

Advantages to Education and Community
i.   Introduce the new approach of PLE in the education technology field
ii.   Enhance the learning motivation, interests and capability to IHL students, thus will increase the value of excellent student, which will be giving it back to the community
iii. Increase community knowledge
iv.   It can be applied as the problem solver to problematic students in gaining their knowledge
v.   Implemented as one of the tools, especially for developing eLearning content environment.

Commercial Values
The technology introduces into EmoAPEL can be sold to the eLearning society and developer, where the process and technique can be adapted and use to solve the problem of the learner while perceive the knowledge. Personalization enhances learner motivation towards their learning.

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