A COMPUTATIONAL MODEL FOR RECOGNISING STUDENTS EMOTIONS IN E-LEARNING SYSTEMS

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Thesis submitted in partial fulfilment of the requirements for the degree of Master of Philosophy

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February 2013
DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the M.Phil thesis under my supervision.

Supervisor:      Dr. A. P. Madurapperuma

Signature of the supervisor:      Date:
ABSTRACT

Online learning is a support tool for educators as well as a medium of delivery of any-time, any-where delivery of a content to a dispersed learner community. Web-based learning environments are a relatively new medium of learning to Sri Lankan universities. Like any learning process, online learning depends on effective communication of human knowledge, whether this occurs in a face-to-face classroom or across the Internet. The effectiveness of online learning also depends on establishing two-way communication between facilitators and learners, and among learners themselves. Although both emotions and interest can increase learners’ likelihood to engage in traditional learning, little is known about the influence of emotions and interest in learning activities in a digital environment. Emotions play an essential role in decision making, managing, perceiving and learning and influence the rational thinking process of humans. Emotions are also important in teaching and learning and often find expression in particular ways, such as interactions with others and motivation in learning. The influence of emotions on e-learning is still not emphasized. Continuous and increasing exploration of the complex set of parameters surrounding online learning reveals the importance of the emotional states of learners and especially the relationship between learning and affective behaviour. Previous research have identified that emotions occur while individuals assess events in their environment that are related to the needs, goals and well-being. Moreover, recent research on the emotional response to online learning has focused on the importance of learners’ feelings in relation to the community of learning.

The aim of the research is to develop a model to recognize learner emotions in online learning environment. Through a critical literature review on affective computing, the study has identified several models and selected Barry Kort’s Learning Spiral Model as the prototype model of the research study. The learning spiral model is a four quadrant learning model in which emotions change while the learner moves through quadrants and up the spiral. This study will be presenting a model which describes the relationship between the online learners learning performances and emotions that occur during online learning process. The research study has built a high-level architecture which consists of three sub modules representing the current context on online learning and two sub modules representing the novel approach of affective learning. Experiments were conducted based on the sub modules developed. The research was focused on identifying a suitable tool to recognise the online learner’s emotions. During the comprehensive literature survey, different tools enabling recognising learner emotions were identified and the study has selected Achievement of Emotions Questionnaire (AEQ) by Pekrun et al. to be applied in recognising learner emotions. Therefore, the study has developed Online AEQ based on the AEQ which is suited for the online learning environment. The study has identified six parameters which represent the learner’s level of learning during the learning experience. These parameters are analysed using multiple regression analysis and a model equation was developed to compute the online learner’s level of learning. Finally the study has analysed and evaluated the correlation between the learner emotions and the observed behaviour. This research study therefore developed a novel model of affective online learning which can be use as a tool to recognise online learner’s emotions with regard to the performance in learning.

Keywords: E-Learning, E-Learners, Emotions, Affective Learning, Learner Performances
DEDICATION

I dedicate this thesis to my parents, sister, husband and my son with love simply because they all are part of it.
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AEQ</td>
<td>Achievement of Emotions Questionnaire</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Tutoring System</td>
</tr>
<tr>
<td>KSA</td>
<td>Knowledge, Skills and Attitude</td>
</tr>
<tr>
<td>LMS</td>
<td>Learner Management System</td>
</tr>
<tr>
<td>LSM</td>
<td>Learning Spiral Model</td>
</tr>
<tr>
<td>MIS</td>
<td>Management Information System</td>
</tr>
<tr>
<td>MME</td>
<td>Multidimensional Model of the Emotions</td>
</tr>
<tr>
<td>MSLQ</td>
<td>Motivated Strategies for Learning Questionnaire</td>
</tr>
<tr>
<td>NA</td>
<td>Negative Affect</td>
</tr>
<tr>
<td>OLAEQ</td>
<td>Online Achievement of Emotions Questionnaire</td>
</tr>
<tr>
<td>PA</td>
<td>Positive Affect</td>
</tr>
<tr>
<td>PANAS</td>
<td>Positive and Negative Affects Scale</td>
</tr>
<tr>
<td>SOLO</td>
<td>Structure Observed Learning and Outcomes</td>
</tr>
<tr>
<td>VL</td>
<td>Virtual Learning</td>
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</table>