

Summary of PhD research

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Title

Various Group Collaboration Strategies For Effective Use of Multi-Touch Display Screens To Improve Undergraduates Learning.

Supervision

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Summary

This is a research on the effective use of the computer technologies to enhance human learning. It is an interdisciplinary study in the technological innovation and learning sciences (TILS). The TILS research explores how current, new and emerging technologies can be designed and evaluated to enhance human learning and interaction. This study integrates knowledge of Computer Science and Information Technology, Education, and Cognitive Psychology, as well as links to other disciplines related to the learning sciences. The scope of the research includes understanding the processes and practices of human learning, and designing new technologies and environments to enhance learning for university students.

Contribution to Knowledge

This research is expected to

- Propose an alternative method to stimulate student's interest and optimize student's learning outcome. The students are expected to be able to solve problems at all levels, as described in Bloom's taxonomy (knowledge, comprehension, application, analysis, synthesis, and evaluation) [1].
- Provide a new technology for a usable and interactive tools, software or system in e-learning environment to learn a subject – it is an instrument for students to interact and play with as they learn.
- Promote effective use of computer science and information technology for education.

Research Background

Generally in most of the universities, the conventional way of teaching a technical subject consists of lectures, tutorials and laboratory exercises. In lectures, students learn the principles and theory of a topic. Following that in tutorials, students are exposed to the problem solving techniques for the particular topic. Meanwhile in the laboratory, students will try to apply the knowledge learnt in both the lectures and tutorials to solve a problem based on a particular case.

Teaching a subject using the conventional method however depends greatly on a teacher. A teacher works hard to make the lectures interesting and interactive. But some students lose interest easily, especially when it comes to a complex problem that requires higher level problem solving skills, thus affecting their capabilities in managing their tutorials and laboratory work. Consequently, students spend a long time studying the topic but do not enjoy the topic. They become frustrated and are unable to apply the knowledge, since they are not motivated to do well. The teacher will soon notice that the problem is due to the students' lack of motivation. The teacher then has to look for a way to stimulate their interest in the topic.

Gardner suggested in the Multiple Intelligences Model (MI) [2] different students has different strengths and learn in different ways. MI proposes seven different intelligences (Linguistic, Logical-Mathematical, Visual-Spatial, Bodily-Kinesthetic, Musical, Interpersonal, and Intrapersonal) to account for a broader range of human potential. It also provides seven different potential pathways to learning. A comprehensive learning environment shall include activities that accommodate for students possess various intelligences. For example, the students competent in interpersonal intelligence enjoy group activities, group discussions while students possess bodily-kinesthetic prefer interaction, demonstration, simulation or role play or a three-dimensional model or a hands-on project [3].

Based on the objectives and the problems, a new learning approach is introduced. The new approach incorporates computers and information technology into learning to create an interesting and interactive environment that suit different students. The new learning approach constructs a number of large format 'multi-touch' display screens to allow groups of students to work collaboratively on studio projects. These display screens will allow multiple simultaneous input points for a number of students. The table below summarized the known and unknown factors of the research.

Table 1: Theory and Hypothesis

Known	To be find out
Features and Advantages of Computer-aided learning and E-learning as summarized in [5] and [6]. E-learning is used in improving teaching and learning for subjects from various disciplines. It is found to be effective and efficient, achieving goals that are unable to be achieved by conventional way of learning. The e-learning in this context is not limited to web-based learning only: 'E-learning incorporates all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices.' [4].	The Effectiveness Of Multi-Touch Display Screens For Collaborative Work.
Students with bodily-kinesthetic intelligence [2] prefer Interactivity. Interactivity and animation will stimulate student's interest and improve learning [7].	Interaction Modes
The students competent in interpersonal intelligence [2] enjoy group activities, group collaboration.	Different Group Collaboration Strategies

Various experiments comprising survey and student assessment will be carried out to collect data on students' performance and students' preferences, where the results will be synthesized into a summary – the outcome of the research.

References

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- [7] Low Yeh Ching, Anthony Wong Kee Ling, Tan Ee Xion, Karen Lee Poh Lynn, Using Computer Animation to Improve Learners' Memory Retention and Interest, *The 4th International Conference on University Learning and Teaching (InCULT) 2008*, Shah Alam, Malaysia, 20-21 October 2008.

About the Researcher

Anthony Wong is a Postgraduate Student at the Faculty of Information Technology, Monash University, Melbourne, Australia since March 2009. Anthony holds a bachelor honours degree in computer science, followed by a post graduate master degree from Universiti Sains Malaysia. Anthony's research interests are multimedia, computer 3D graphics, computer aided learning and distributed system. He has presented several research papers of his area of interest in international and national conferences.