DESIGN AND EVALUATION OF A WEB-BASED CONSTRUCTIVIST LEARNING ENVIRONMENT FOR PRIMARY SCHOOL STUDENTS

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To my parents, Darshan Singh and Joginder Kaur, and

my brother, Prof. D. S. Ranjit Singh

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ABSTRACT

The purpose of this study was to determine the effectiveness of a web-based constructivist learning environment (WebClen) on the enhancement of higher order thinking skills and content acquisition of 36 Year 4 high, mixed and low ability students. The study also examined the characteristics of cooperative and collaborative learning processes employed by the three groups of students. Finally, the study investigated the role of the teacher and also student perceptions towards learning in a web-based environment.

The study employed a one-group repeated measures design aimed at measuring the effects of web-based learning on thinking skills and acquisition of Geoscience content . Three tests were administered at the pre-treatment and post-treatment stages of the study. The treatment consisted of a four-week Geoscience program involving problem-solving tasks and activities focused on developing thinking skills and cooperative and collaborative learning processes. During this period, qualitative data were also collected through observations, opinionnaires and questionnaires.

The findings indicate that as a result of the treatment, there was a significant improvement in learners' higher order thinking skills and content acquisition while the improvement in students' information skills was not significant.

Secondly, the high, mixed and low ability groups responded differently to the various tasks and activities used in the study. Groups of high ability students benefitted from peer evaluation and online journal writing experiences. Low ability groups benefitted from online critical report writing and frequently asked questions. On the other hand, most of the tasks and activities did not appear to benefit the mixed ability groups.

Thirdly, it was found that the groups varied in the way they employed cooperative and collaborative learning processes. While high ability groups focussed on process related tasks (such as asking for opinions and feedback), low and mixed ability groups focussed on skill related tasks (such as keyboard skills).

Fourthly, the study uncovered the defining characteristics of a teacher's role within a technology-rich teaching and learning environment. It was thus found that the teacher plays a multi-faceted role in enhancing the content, thinking, linguistic, information-seeking and technological skills of learners in a constructivist learning atmosphere.

Finally, the study revealed that students perceived the web-based learning environment positively. This was evident in their comments on the flexibility to choose the learning activities, the variety and availability of information and self-paced learning.

The study draws several implications for the role of technology in teaching and learning, for the role of the teacher as a multi-skilled individual and the potential for creating a positive learning atmosphere within a constructivist paradigm.

Rekabentuk dan Penilaian Satu Persekitaran Pembelajaran Konstruktivis Berasaskan Web Untuk Pelajar Sekolah Rendah

ABSTRAK

Tujuan kajian ini ialah untuk menentukan keberkesanan satu persekitaran pembelajaran konstruktivis berasaskan Web terhadap peningkatan kemahiran berfikir dan penguasaan isi kandungan Geosains seramai 36 orang pelajar tahap tinggi, campur dan rendah dari sebuah sekolah rendah. Selain itu, kajian ini juga menilai ciri-ciri utama proses pembelajaran secara kerjasama dan kolaboratif yang digunakan oleh ketiga-tiga kumpulan pelajar ini. Akhir sekali, kajian ini melihat peranan guru dalam persekitaran yang menggunakan teknologi Internet serta persepsi pelajar terhadap pembelajaran berasaskan Web.

Kajian ini menggunakan rekabentuk *repeated measures* berasaskan sekumpulan pelajar yang bertujuan untuk menguji keberkesanan pembelajaran berasaskan Web terhadap kemahiran berfikir dan pemerolehan isi kandungan Geosains. Tiga ujian dikendalikan sebelum dan selepas kajian. Rawatan kajian terdiri daripada pendedahan kepada topik Geosains selama 4 minggu yang melibatkan aktiviti penyelesaian masalah, dan aktiviti yang meningkatkan kebolehan berfikir pelajar serta proses kerjasama dan kolaboratif dengan menggunakan Web sebagai tapak interaktif utama. Semasa waktu berkenaan, data kualitatif juga dikumpul melalui proses pemerhatian, tinjauan pendapat dan soal selidik.

Dapatan kajian menunjukkan bahawa pertamanya, berlaku satu peningkatan signifikan dalam kemahiran berfikir tahap tinggi pelajar serta penguasaan isi kandungan, manakala tiada peningkatan signifikan dalam kemahiran maklumat. Kedua, pelajar tahap tinggi, sederhana dan rendah memberi respons yang berbeza

terhadap aktiviti-aktiviti dalam kajian ini. Pelajar tahap tinggi bermanfaat dari aktiviti penilaian rakan sekumpulan dan penulisan jurnal *online*. Pelajar tahap rendah pula bermanfaat daripada penulisan laporan *online* secara kritikal dan aktiviti *frequently asked questions* (FAQ). Manakala kumpulan campur tidak mendapat manfaat yang ketara dari mana-mana aktiviti *online*. Ketiga, didapati, kumpulan tahap tinggi, kumpulan pelajar bercampur serta kumpulan pelajar tahap rendah menggunakan ciri-ciri kerjasama dan kolaboratif yang berbeza dalam proses pembelajaran mereka. Kumpulan tahap tinggi berfokus kepada tugas-tugas yang berteraskan proses (seperti meminta pandangan serta maklum balas rakan) manakala kumpulan bercampur dan tahap rendah berfokus kepada tugasan berkaitan kemahiran (seperti kemahiran menggunakan papan kekunci). Keempat, kajian ini mencirikan secara terperinci peranan guru dalam persekitaran yang kaya dengan penggunaan teknologi. Didapati guru bermain enam peranan utama sebagai fasilitator iaitu: pakar isi kandungan, pakar teknologi, pakar dwibahasa, pendorong proses pembelajaran, penyokong pembelajaran kerjasama dan kolaboratif dan pengawas kemajuan pelajar. Akhir sekali, kajian ini mendapati bahawa pelajar-pelajar memberi respons yang positif terhadap persekitaran ini. Ini terbukti daripada komen-komen pelajar tentang terdapatnya fleksibiliti dalam memilih aktiviti pembelajaran, terdapatnya kepelbagaian maklumat serta pembelajaran yang mengikut kelajuan diri *(self-paced)*.

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