Paper presented at the IEEE 2nd International Workshop on Technology for Education in Developing Countries : 30 Aug - 1 Sept. 2004, Joensuu, Finland.

The Web-Based Learning Environment: A Comparative Study between the Constructivist and Content–Based Approaches

27 2 04

Puvaneswary Murugaiah, Hanafi Atan, Dianne Szalina Samsudin & Rozhan M Idrus

School of Distance Education
Universiti Sains Malaysia
11800 Penang
Malaysia

ampuva@usm.my, ahanafi@usm.my, rozhan@usm.my

Abstract

This article reports on the investigation into the differences in students' perceptions when they are subjected to two different instructional designs of the Web-based Learning Environments (WBLEs), one utilising the constructivist approach adapted from the Black and McClintock Model and the other utilsing the traditional content-based approach. As envisaged, the content-based approach of the WBLE received significant favourable responses in terms of the design of the course contents. However, in terms of the content delivery, the respondents felt that the constructivist WBLE provided them with more meaningful learning opportunities through the provision of learning in context, on-line collaboration and the availability of the on-line resources.

1. Introduction

The current accepted pedagogical approach to learning is the constructivist approach wherein the learning is student-centred, requiring students' active involvement in the construction of knowledge and they assuming responsibility for their own learning [1]. The learning occurs in the collaborative environment and the teacher acts as a facilitator. The teacher does not deliver the course contents but guide the students in the process of discovery, inquiry and analysis. The unique features and attributes of the Web technology, namely, the powerful information manipulation tools and communication means, make the constructivist approach in WBLEs particularly appropriate and suitable. The collaboration, involving a student-facilitator and students-peers can be conducted via the synchronous chat or asynchronous forum board. The learning resources required by interpretations and multiple manifestations can be supported by links to external Web resources. Despite the importance of the WBLE utilising the constructivist approach in the delivery of course materials especially in open and distance learning, the learning processes of the constructivist WBLE relative to the content-based WBLE is not as yet fully understood. The present study, therefore, seeks to explore the relative differences between the two approaches.

2.0 Methodology

Two WBLEs were specially designed and developed. The first WBLE was the content-based WBLE and the second was the constructivist WBLE.

2.1.1 The content-based WBLE

The design approach of the content-based WBLE is adapted from the Dick & Carey Model [2]. The model consists of introductory information, lesson objectives, content delivery, and provision of examples. The learning process in the content-based WBLE is a one-way didactic knowledge transmission from the contents to the students. No collaboration or facilitation is involved in this process. It involves students accepting and memorising the facts given in the Web pages and recalling the materials learned when required.

2.1.2 The constructivist WBLE

The design of the constructivist Web-based learning is adapted from the Interpretation Construction Design Model proposed by Black & McClintock [3]. The model consists of construction, interpretation construction, contextualisation, cognitive apprenticeship, collaboration and multiple manifestations. From a total of 460 students enrolled in this course, 81 were randomly selected for the study. They were first exposed to the content-based WBLE for a period of $1^1/_2$ hours and subsequently to the constructivist WBLE for the next $1^1/_2$ hours. At the end of the 3-hour treatment, a questionnaire was administered to the students. The questionnaire consisted of 40 items under the categories of course contents, teaching and learning processes and effectiveness. Only items that showed significant differences between the two means were reported.

Table 1. Comparative analysis between the content-based approach and the constructivist-based learning in terms of course contents

Items	Content-based learning			Constructivist-based learning			T-test	Sig.
	N	mean	std	N	mean	std		
Contents were easily understood	81	3.012	0.749	81	2.777	0.806	2.007	0.048
Contents were easily followed	81	2.938	0.695	81	2.679	0.771	2.256	0.027
Contents were clearly delivered	81	3.000	0.670	81	2.691	0.752	2.863	0.005
Contents related to everyday experiences	80	2.812	0.657	80	3.087	0.715	-2.872	0.005

3.0 Results and discussion

The comparative analysis between the content-based WBLE and the constructivist WBLE on items related to the course contents is depicted in Table 1. The instructional configuration of the Web-based content-based learning (CBL) focused on the directed, individualised instruction on information that was well structured with the design of the learning activities ranging from low level to progressively more complex activities.

Due to the CBL instructional configuration, it was expected that high mean values would be obtained on items related to the course contents on the CBL approach as compared with the problem-based learning (PBL) approach and these are indicated in Table 1. There were significant differences on items related to the parts of the contents that were interesting, easily understood, simple to follow and delivered clearly, all these favouring the CBL approach. However, as expected, on items related to daily experiences, the constructivist WBLE approach registered higher means with greater significant differences compared to the content-based WBLE approach.

Table 2 shows the comparative analysis of the means of the constructivist WBLE approach relative to the content-based WBLE approach on items related to the course content delivery. Out of a total of 22 items, 8 items registered significant differences with all of them favouring the constructivist WBLE approach. The respondents correctly perceived that in the constructivist WBLE approach, the delivery of the course contents allowed them to apply the newly constructed knowledge in the problems associated with daily and practical situations. The aspect of collaboration played a vital role in the construction of knowledge and understanding and this was made possible through the process of articulation, negotiation and reflection on ideas.

The comparative analysis of the two approaches in terms of the learning effectiveness as perceived by the students is shown in Table 3. The students perceived that the constructivist WBLE was effective, the learning was enjoyable and the approach enabled them to establish a mind map connecting the important concepts that were being learned. The provision of collaboration, learning in context and the utilisation of the full potential of the Web made the constructivist WBLE effective and enjoyable compared to the traditional content-based WBLE.

Table 2. Comparative analysis between the content-based approach and the constructivist-based learning in terms of teaching and learning processes

Items	Content-based learning			Constructivist-based learning			T-test	Sig.
	N	mean	std	N	mean	std		
I was given a chance to apply the new knowledge	80	2.962	0.604	80	3.212	0.588	-2.899	0.005
I was solving problems cases related to daily life	80	2.637	0.641	80	3.012	0.665	-4.029	0.000
I had the opportunity to solve real daily problems	80	2.850	0.676	80	3.037	0.683	-2.412	0.018
I contributed ideas and thinking in my learning	80	2.812	0.676	80	3.100	0.648	-3.044	0.003
I used my own strategy in the learning process	80	2.762	0.556	80	3.350	0.638	-5.961	0.000
I had the flexibility to give my own answers to problems	80	2.737	0.589	80	2.975	0.728	-2.351	0.021
I was encouraged to think on my own	81	3.000	0.612	81	3.296	0.600	-3.162	0.002
I was required to find meanings in materials that I was supposed to learn	81	3.024	0.631	81	3.308	0.583	-3.042	0.003

Table 3. Comparative of analysis between the content-based learning and the constructivist-based learning in terms of effectiveness.

Items	Content-based learning			Constructivist-based learning			T-test	Sig.
	N	mean	std	N	mean	std		
The learning was effective	81	2.963	0.621	81	3.370	0.557	-4.859	0.000
The learning was enjoyable	81	2.876	0.578	81	3.172	0.685	-2.961	0.004
My ability to establish the relationships between the concepts of the materials learned increased	81	2.925	0.666	81	3.358	0.712	-4.572	0.000

4.0 Summary

This study elucidated the learning processes of the constructivist WBLE in comparison to those of the content-based WBLE. The findings revealed that the constructivist approach was perceived to be beneficial to the students, providing them with the learning activities that were engaging and stimulating and promoting individual perspectives towards the understanding of the learning materials. Overall, students felts that the learning processes made available by the constructivist WBEL was enriching, effective and enjoyable.

5.0 References

[1] Jonassen, D.H. "The constructivist learning environment on the Web: engaging students in meaningful learning". Paper presented at the Education Technology Conference and Exhibition, 9-11 February 1999, SUNTEC City, Singapore.

[2] Dick, W. and Carey, L. *The Systematic Design of Instruction*. New York: Harper Collins Publishing. 1996.

[3] Black, J.B. and McClintock, R.O. *An Interpretation Construction Approach to Constructivist Design*. In B. Wilson (Ed.). Constructivist Learning Environment. Englewood Cliff, NJ. : Educational Technology Publication. 1996. pp 25-32.