WebQuest in Biology Learning: Evaluation of Teachers' Perception

KAMISAH OSMAN, ATY MUYASSAROH, LEE TIEN TIEN
Faculty of Education
The National University of Malaysia
43600 UKM Bangi, Selangor
MALAYSIA
kamisah@ukm.my

Abstract: - Teaching and learning based on web or web-based learning is a concept which integrates information and technology in education. Teachers and instructors have to assist their learners to learn to function in this information environment. However, teacher trainers and instructors have limited experience in the integration of ICT by using web in their teaching, mainly for Biology subject. The Indonesian Ministry of Education has started to implement ICT in the process of learning and teaching. Hence, it geared our attention to evaluate the suitability of WebQuest to be used in teacher training among Biology teachers. Results showed those teachers' perceptions towards WebQuest on the aspects of technical, content, as well as teaching and learning structure were on the high level. However, there was no significant difference on teachers' perception towards WebQuest based on their experience. Further analysis recommends that evaluation study should be done on students to gauge their perception towards the WebQuest. This is to ensure effective Biology learning using ICT in general and WebQuest in particular.

Key-Words: - Web-based learning, evaluation, WebQuest, Therapeutic Stem Cell Cloning

1 Introduction

The advances in technology pervade our entire life. Computer technology in education is becoming an integral part by infusing in the learning and teaching environment. In dealing with technology, Russell et al. [1] speculated that understanding how to use technology is not the same as understanding how to teach with technology. It is because teachers should understand how to integrate that technology in the proper instructional design and to create effective learning environment that meet students' need to generate meaningful learning. Teachers must learn how to sort the information, judge its reliability, validity, as well as relevance.

It is important for educators to design learning opportunities that assist today's students to become effective information users. According to Norton and Wilburg [2], effective instructional design to guide students to become effective information users should help students to learn to *search* for information, *sort* and *judge* information, and *create* and *communicate* ideas and concepts as the results of information use (SSCC). Each of these activities can be supported by a range of tools, related to a particular problem arising within the domain of particular content areas, and woven together with knowledge, problem solving, and literacy abilities.

2 Problem Formulation

Research [3] showed that web-based learning can be used to make learning as an interesting and engaged activities for learners. However, the use of web-based learning still lack in teaching and learning, especially in teacher training in the central of Kalimantan, Indonesia. Teacher trainers and instructors in that area have limited experience to integrate ICT in their teaching, mainly for Biology subject. They may use web or internet primarily to search the information or knowledge but did not meaningfully integrate it in their teaching and learning [4].

The Indonesian Ministry of Education has started to implement Information and Communication Technology (ICT) in the process of teaching and learning. ICT has changed the process of teaching and learning by using computers, LCD, as well as multimedia software. ICT is important to process and save information as well as spreading the information systematically, regularly and efficient. Therefore, it is expected that ICT can increase students' interest and motivation to learn. In addition, learning with ICT can change learners' perception that learning is not always doing something with textbooks only.

Although the implementation of ICT in education has been started, but the national syllabus or curriculum for ICT in Indonesia does not apply

certain textbooks to be used. There are also no special guidelines to the way Biology teachers can do the integration of ICT, especially Web or internet to their teaching.

3 Problem Solution

Harris in Norton and Wilburg [2] asserted an instructional strategy - an activity structure called WebQuest as a powerful way to design learning opportunities that bring the whole process of information via SSCC altogether. Initially, the concept and ideas of WebQuest was generated by Bernie Dodge of San Diego State University in 1995. His idea on WebQuest was great on how best to integrate internet into the classroom environment. His work with WebQuests is one of the most creative efforts aimed at reforming instructional practice. WebQuests are designed to use learners' time well, to focus on using information rather than looking for it, and to support learners' thinking at the levels of analysis, synthesis and evaluation. According to Dodge [5], a WebQuest is an inquiry-oriented activity in which students interact with information gleaned primarily from resources on the Internet.

Interaction between learners and learning resources in teaching and learning based on the web can fulfil students' satisfaction in learning [6]. Hence, WebQuest is said to be one of the good sample of conducting project based learning and collaborative learning in the classroom. We were interested to develop and evaluate the Biology WebQuest for the topic: Therapeutic Stem Cell Cloning. The topic is chosen because cloning is in the curriculum for high school in Indonesia and it is a controversial issue in this decade. However, this paper only focuses on the evaluation part where the WebQuest was evaluated by teachers on three aspects.

3.1 Objectives

This paper describes the teachers' perception towards WebQuest on topic Therapeutic Stem Cell Cloning from the aspects of technical, content, as well as teaching and learning structure. Besides, we were interested to investigate the difference of teachers' perception towards WebQuest on topic Therapeutic Stem Cell Cloning based on teaching experience.

3.2 Respondents

Respondents in this study consist of 48 senior high school Biology and/or Science teachers who were randomly chosen from 4 Senior High School in central Kalimantan Tengah, Indonesia. Teachers who were chosen to be respondents in this study were training participants. The demographic information of the respondents is presented in Table 1 below.

Table 1. Demographic information of respondents

Variable	Category	Frequency	Percentage (%)
Gender	Female	21	43.8
	Male	27	56.3
Age	26 - 30	13	27.1
	31-40	24	50.1
	>40	11	22.9
Teaching Experience	<5	4	8.3
	5 - 10	21	43.8
	>10	23	47.9

3.3 Instruments

3.3.1 Questionnaire

This research made use of questionnaire as a main tool for data collection. The questionnaire was proposed to measure teachers' perception towards WebQuest in technical, content, as well as teaching and learning aspects. Questionnaire in this research was adapted from previous studies conducted by Dodge [7] and Hong [8]. The validity and reliability of the instrument were systematically justified through pilot study.

There were three main parts in the questionnaire: Part A, B, and C. Part A consisted of the respondents' background information, Part B deals with information about respondents' ICT competency level, and finally in Part C there was 44 items to find out teachers' perception towards WebQuest. Respondents will choose either 1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, and 5 – strongly agree. The distribution of items in Part C is as presented in Table 2.

Table 2. Distribution of items in Part C

Construct	Number of items
Technical Aspects	7
Content of WebQuest	6
Teaching and Learning Structure, Learning theory, Learning Strategy	31

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3.3.2 WebQuest

In Preface, researcher gave brief description about WebQuest and its use in the teaching process. We clarified WebQuest as an instructional design for integrating technology in Biology classroom. In the Introduction part, we tried to make learners aware of the upcoming problem. The problem is related to what learners' views on therapeutic cloning, especially to cure Parkinson's. We tried to grab learners' interest and motivate them to learn by posing some questions. In the Task, we determined the objectives of doing the task, gave the description of what learners should do. In Process and Resources, we presented some steps to be followed by the learners. The resources consisted of the websites and links which were related to the topic of therapeutic cloning. In Evaluation part, we provided a rubric. This rubric was presented to help learners as well as facilitators to always keep in the right track in each activity as well as the performance expected. The Conclusion part debriefs the learners and review what was learned. Teacher Guidance part can help instructors/facilitator or the user to know standard of the curriculum, implementation, additional resources, variation of doing WebQuest, evaluation and conclusion.

4 Results and Discussion

Respondents evaluated the technical aspects, content, as well as teaching and learning structure of WebQuest. Results showed that the average mean of the three aspects is 4.36, while its standard deviation is 0.41. It means that teachers' perception towards WebQuest was on high level. In other words, the level of acceptance towards WebQuest in the aspects measured was high. From the finding, it can be concluded that all respondents generally showed positive perception towards WebQuest as teaching strategy in teaching Biology. This finding is consistent with the findings of previous study in web-based learning by Chang [3], Hamdan [4], Jung et al. [6], Brabazon [9], Bartoshesky [10], Law et al. [11], and Hong [8]. The detail information about the mean value for each aspect is presented in Table 3.

Table 3. Mean value for three evaluation aspects

Aspects	Mean	Standard Deviation
Technical Aspect	4.45	0.43
Content of the WebQuest	4.32	0.49
Teaching and Learning Structure	4.32	0.44

Teachers in this study perceived that WebQuest was interesting from the technical aspects such as navigation, graphics, interface, menus, icons, and the use of the colour. Positive perception towards technical aspects is important because this aspect will influence respondents' perception towards WebQuest as a teaching and learning media.

Additionally, teachers also agreed that the use of language was easy to understand and the content was suitable. Teachers also thought that information presented was useful for cloning topic. Navigation in the WebQuest was perceived by most of the respondents as smooth and it provided easy access for e-learning. The finding also showed that links provided in the WebQuest had a very strong relationship with the tasks and helped learners to solve them, as well as to enhance teachers' understanding about Therapeutic Stem Cell Cloning. This finding supports the research finding of Brabazon [9] and Law et al. [11]. Their study depicted that by web-based learning, learner will learn information literacy and web as a presentation of their project. Moreover learner will have positive attitude toward internet and not afraid to learn with internet.

Teachers also agreed that teaching by using WebQuest made them accept information easily. Teachers perceived that WebQuest was very interesting as teaching strategy to be used in teaching and learning of Biology. This is consistent with research finding from many previous similar studies on the which found that students were more enjoyable in WebQuest learning than using traditional teaching and learning approaches

We also conducted One Way ANOVA to find out if there was a significant difference of teachers' perception towards WebQuest on topic: Therapeutic Stem Cell Cloning from the aspects of technical, content, as well as teaching and learning structure based on teaching experience. Results of the ANOVA analysis for the three aspects are presented in Table 4-6.

Table 4. ANOVA result for teachers' perception towards Technical Aspect of the WebQuest

	Sum of squares	df	Mean Square	F	Sig
Between groups	5.919	10	0.592	1.615	0.141
Within groups	37	37	0.367		
Total	19.479	47			

Table 5. ANOVA result for teachers' perception towards Content of the WebQuest

	Sum of squares	df	Mean Square	F	Sig
Between groups	6.140	9	0.682	1.944	0.075
Within groups	313.339	38	0.351		
Total	19.479	47			

Table 6. ANOVA result for teachers' perception towards Teaching and Learning Structure of the WebQuest

	Sum of squares	df	Mean Square	F	Sig
Between groups	8.812	21	0.420	1.023	0.473
Within groups	10.667	26	0.410		
Total	19.479	47			

Based on the tables, the significant value are 0.141, 0.075, and 0.0473 whereby the value are higher than α (0.05). It means that there is no significant difference on teachers' perception towards WebQuest based on teachers' experience.

Teaching experience is one of teachers' backgrounds which were needed to be taken into consideration. Discussion on Constructivism involved discussion about experience of learners as one of the factors in order for "learning process" to be occurred [12]. In fact, Newby et al. [13] emphasized that learning may come about through direct experience or vicarious experience. Differences in teaching experience means that teacher have different "learning" in teaching area. Teachers with longer time of teaching considered to learn more in teaching in terms of time. Due to this reason, ANOVA is performed to analyze whether there is a significant difference of teachers' perception towards Web-WebQuest. However, ANOVA analysis indicated that there was no significant difference of teachers' perception towards WebQuest based on teaching experience. It means that in this study, teachers from variety of teaching experience do not have significant difference in their perception towards WebQuest.

5 Conclusion

It can be concluded that teachers' perceptions towards WebQuest on the aspects of technical, content, as well as teaching and learning structure of the WebQuest were on the high level. However, there was no significant difference of teachers' perception towards WebQuest based on teachers' experience. Teachers as changing agent in education should have open mind towards changes and alternatives offered by technology in order to improve the quality of teaching and learning regardless of their teaching experience. They should make use of the WebQuest provided in the internet or make their own WebQuest to be implemented in their teaching and learning process. However, skills of searching meaningful information to be put as resources in the WebQuest are needed. The choice of websites as information resources should meet the learners' necessity to get meaningful learning.

This research focused on teachers' perception as an evaluation on WebQuest which acts as teaching strategy in Biology. We suggest that an advance study may be performed to find the effectiveness of using WebQuest in the process of teaching and learning. Besides that, study also can be done on students to find out their perception towards the WebQuest. Teachers and students might have different perceptions on the WebQuest. Hence, comparisons between teachers' and students' perception should be one of the major focus for future study. This is because the effectiveness of any teaching and learning innovation could only be achieved if teachers and students have similar opinions as well as mutual respect upon one another.

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