

Wikipedia in Promoting Science Literary Skills in Primary Schools

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ABSTRACT

In learning Science, online environments allowing for user generated content are becoming increasingly important since they offer possibilities for learners to elaborate on assignments and projects. This study investigates how Wikipedia can serve as a means for enhancing science literary skills when students are encouraged to participate in constructing text using science facts and exchanging peer responses. The research focus is on exploring the consensus among Malaysian educationists and officers on the use of Wikipedia in facilitating teaching to enhance and promote interest to learn Science and to gather perceptions of student's satisfaction in using Wikipedia to construct ideas to learn a science concept. In this study, the Fuzzy Delphi technique was used to get consensus among 20 experts who were lecturers and teachers teaching Science. The findings show that Wikipedia has the potential to be used as an instructional tool in learning Science in line with the current trends of collaboration and social networking in education. The use of Wikipedia as an alternative teaching tool had a very positive perception from students. Browsing through the Wikipedia to gather facts and generate an idea in learning a Science topic has the potential to improve both science literacy skills and thinking skills in students.

Keywords: *Wikipedia, teaching, learning, science*

INTRODUCTION

Malaysia has emerged bottom in three separate studies conducted by standardized international indices. The UN Education Index ranked Malaysia 98 out of 181 countries. The Program for International Student Assessment (PISA), which evaluates levels of literacy amongst 15-year olds in Mathematics, Sciences and Reading skills, as well as critical problem-solving as opposed to memorization, placed Malaysia 55 out of 74 countries. Just as we attempt to gasp for some "breathing space", there is the result from the Trends In Mathematics and Science Study (TIMSS) 2011 which revealed a significant drop in the performances of Mathematics and Sciences in Malaysian students across all four temporal occasions of evaluation in the period beginning from 1999.

The TIMSS 2011 report revealed a plummeting trend in the position of Malaysia in the Mathematics subject where the rank fell from 16th (1999) to 10th (2003), 20th (2007) and 26th (2011). Meanwhile our position in the rank for Science subject is 22nd (1999), 20th (2003), 21st (2007) and 32nd (2011). Similarly, our average marks for the Mathematics subjects fell from 519 points (1999), to 508 points (2003), 474 points (2007) and 440 points (2011); dropping by 79 points. Average marks in the Sciences subject also witnessed the same downfall from 492 points (1999) to 501 points (2003), 471 points (2007) and 426 points (2011); a shortage of 66 points. It is worth noting that marks less than 500 points are considered as "unsatisfactory".

Looking at the poor performance of Malaysian students in the TIMSS 2007, a collection of research findings and proposals were discussed and a report was finalized. One of the proposed suggestions was to increase the infusion of technology and social media in classrooms (Ng Soon Boon, 2012). In this proposal, it was found that encouraging students to collaborate in virtual learning with their formal education resulted in high achievers and tremendous increase in interest to learn Science.

In relevance for this study there has been an increase in the number of online environments allowing for more

user generated content in recent years. This has opened up new ways of working and learning. Since social software has become part of the daily life of students at university, the question of integrating such technologies into learning is a key concern in education. In exploring science, this has become a tremendous opening, giving students the opportunity to engage in various ways and with different online tools. Therefore, user modified and interactive web environments such as wikis are potentially beneficial for science learning. It is thus of interest to investigate the use of such technologies and to explore possible implications for instructional design modules design. The wiki itself holds certain affordances, such as options for interaction in the relationship between the participants and the tool. Wiki technology offers web spaces for structuring content and designing for interaction.

Research Objective

The objective of this study was to get consensus among experts on the use of Wikipedia in facilitating teaching to enhance and promote Science literary skills and as a tool for learning and exploring science in classrooms. The research questions are as follows:

1. How do experts view the use of computers in facilitating teaching to enhance and promote interest among students to learn Science?
2. How do experts view the use of Wikipedia as a tool for learning and exploring science in schools?
3. How do students react in using Wikipedia to learn Science?

METHODOLOGY

The design of the study employs the Fuzzy Delphi technique which uses a combination of interview and survey to collect data among experts. It consists of several rounds of data collection and verification of the questions to enhance reliability. Interviews were conducted in the first phase. The data from the interviews would be used for the Fuzzy Delphi technique for data collection among the experts.

Sample

The sample comprises 20 lecturers and teachers from an institution and an urban school respectively. All respondents have been in the teaching line for more than five years. The experts were chosen based on their credibility and experience in science teaching. The choice of experts was justified based on their academic qualifications and expertise in teaching science.

Instrument

The instruments in the study consist of the interview protocol, a list of structured interview questions and a questionnaire developed using the Fuzzy Delphi technique. The questionnaire is divided into three main themes developed from the analysis of the interview transcripts collected on the prospects of using Wikipedia in teaching science. The themes are teachers and technology in science, students' critical thinking and the use of Wikipedia in teaching science.

Data collection and analysis

Firstly, three experts with differing areas of expertise were interviewed to determine their views on the potential of using Wikipedia in the teaching of science. The interview was audio-recorded and observations on non-verbal features were noted during the interview. The interview transcripts were analyzed to facilitate construction of the questionnaire.

The questionnaire consists of 30 survey questions on the potential use of Wikipedia for

Teaching Science. A 5-point Likert scale was used as follows: 1- *Strongly agree*; 2- *agree*; 3 –

unsure; 4 – *disagree*; 5 – *strongly disagree*. The analysis of data was done using negative Triangular Fuzzy Number to produce a negative scale (similar to a Likert scale). In this study, the scale used to translate negative linguistic variables to fuzzy number (Table 1)

Table 1 The scale used to translate negative linguistic variables to fuzzy number

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Likert scale	1	2	3	4	5
Triangular	0.60, 0.80, 1.00	0.40, 0.60, 0.80	0.20, 0.40, 0.60	0.10, 0.20, 0.40	0.00, 0.10, 0.20
Fuzzy Number	1.00	0.80	0.60	0.40	0.20

Two key points in the fuzzy rules are triangular fuzzy number and defuzzification process. For the triangular fuzzy number is used to produce a scale (similar to a Likert scale). This scale is used to translate the variables to the fuzzy number. For this study we use a scale of 5 for strongly agree (0.60, 0.80, 1.00), 4 for agree (0.40, 0.60, 0.80), 3 for unsure (0.2, 0.4, 0.6); 2 for disagree (0.1, 0.2, 0.4), and 1 strongly disagree (0.0, 0.1 and 0.2). The defuzzification method for determining the position of each of the variables and sub variables is done using the formula $A_{max} = 1/3 * (a_1 + a_2 + a_m)$.

FINDINGS AND DISCUSSION

Teachers and technology in Science

The results show that 10 themes emerged when the analysis of experts' opinions was done. The analysis shows that the experts agreed virtual learning must be used in as a tool to teach science (Defuzzification score: 20.7). However, there seems to be lack of planning and monitoring in the implementation of using technology in teaching science (Defuzzification score: 20.4). They also agreed that teachers are becoming more comfortable with computers and have adapted to teaching Science using technology (Defuzzification score: 20.3).

Students' critical thinking

Novel methods and teaching resources can motivate students to continue learning to improve their critical thinking skills and science literary skills. However, students are perceived to be more concerned about memorizing Science facts rather than understanding them (Defuzzification score: 19.8). The experts also agree that thinking skills can be taught (Defuzzification score: 19.5) perhaps through reading more articles on Science to help students build their thinking skills in Science (Defuzzification score: 19.2)

The use of Wikipedia in teaching science

There was a high score on students lacking the skill to evaluate relevance and reliability (Defuzzification score: 22.6). Through online learning but with guided steps may enhance students' motivation to learn Science (Defuzzification score: 21.6). Online learning also provides a comfortable learning environment (Defuzzification score: 20.6). The vast knowledge in Wikipedia encourages curiosity not only in Science but in other fraternity as well (Defuzzification score: 19.6). Through this inquiry based learning aided by technology may promote lifelong learners among students in the future (Defuzzification score: 18.6).

Development of Module

Based on the findings gathered from the data analysis, a module (Figure 1 & Figure 2) is developed using the scores as a guideline. This is to ensure that the module meets the requirement needed and achieves the objective of this study. As such, a lesson plan is drawn out as follows:

Lesson Plan Overview	Details
Electronic Support	Wikipedia, Frog VLE
Teaching Technique	Project using Wikipedia
Stage 1: Introduction	1. Teacher asks the students to recall their understanding of the Wikipedia
Stage 2:	1. Teacher informs students that today's lesson will be on Wikipedia and Frog VLE.

2. Teacher instructs students to work in groups of four to state the relationship between the effect of heat and on materials.
3. Teacher asks students to find an example in everyday life that uses the concept of heat effect.
4. From the example, students are requested to design an experiment that can explain the science concept.
5. Group presentations are displayed in PowerPoint presentation

Stage 3:

1. Teacher asks students after reading over their material if they think their friends will be able to understand the concept. Teacher asks students what they would add to their information to make it easier to understand and to post their answers in the discussion forum in the Frog VLE

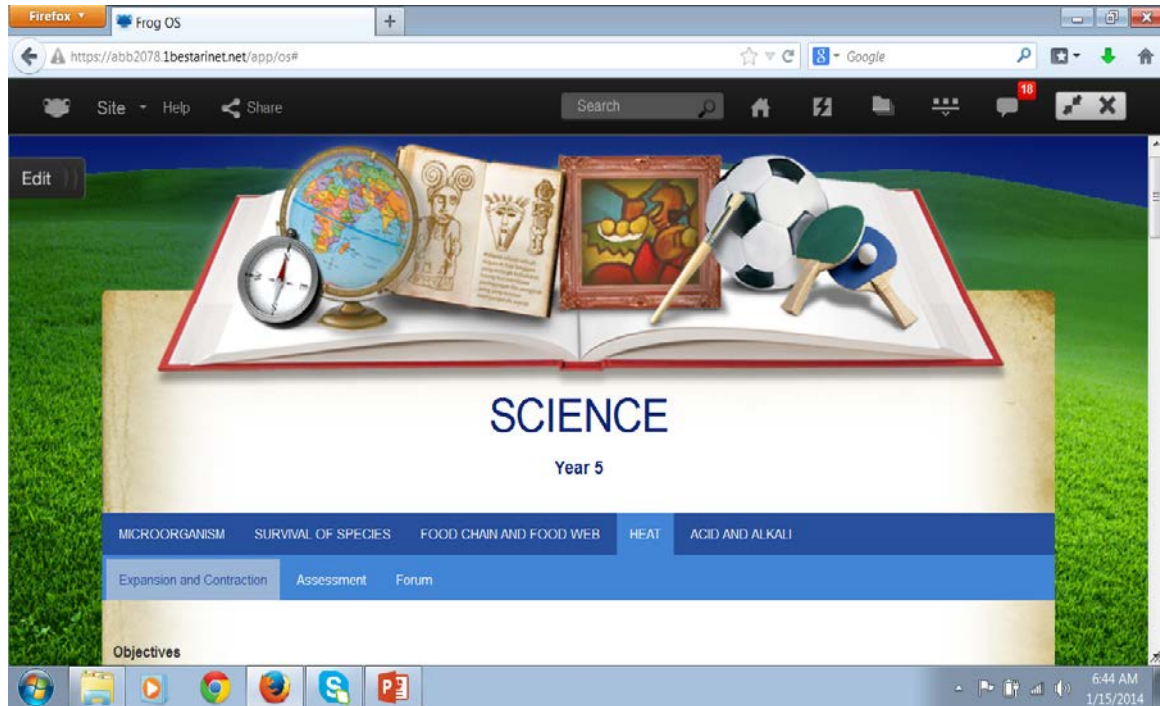


Figure 1. Wikipedia Module

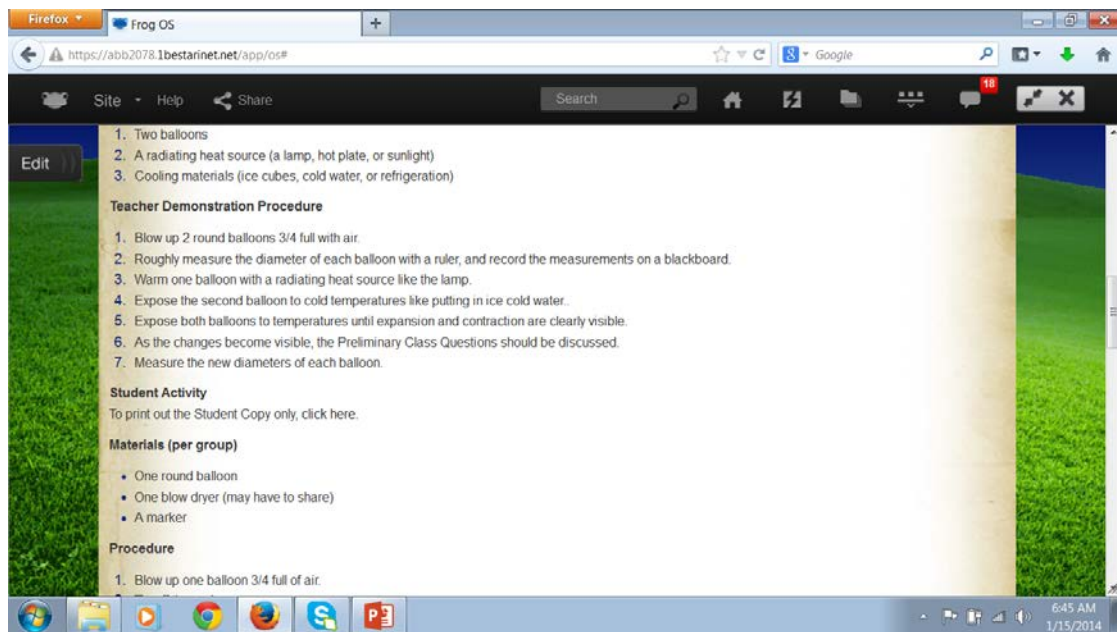


Figure 2. Wikipedia Module

Students were randomly chosen and were interviewed to seek their opinion about the integration of technology in learning Science. The findings are as follows:

- a) The whole process of using the media (Wikipedia) to look for explanations was very stimulating. (*"...it was like a treasure hunt..."*, S1)
- b) There were many new found science facts besides what is taught in the text book in that topic. (*"...there were many new things I learnt from searching answers to complete my assignment"*, S3)
- c) Sites such as the Wikipedia are now seen in a new perspective, as a tool for learning and a gateway for knowledge (*"...there are so many things I can learn from the Internet"* S2)
- d) Students were overwhelmed with the amount of texts on the questions assigned to them that they were confused and were demotivated to continue (*...very difficult to read everything. Don't know which one to choose. I just simply take one.."* S2)

During the implementation, there were a few challenges and barriers that were deemed unavoidable but may have room for improvement in future. Among others, time was a constraint as students have to read the many links available to find the most suitable answer for their assignment. The language which is English in all the links was a barrier to most students. Students also felt demotivated when they could not explain or understand a text. It was also found that their purpose in answering questions was still bound to the sole purpose of answering the question right rather than explaining the answer through their understanding.

CONCLUSION

The use of Wikipedia as an alternative teaching tool had a very positive feedback from students. Browsing through the Wikipedia to gather facts and generate an idea in learning a Science topic has the potential to improve both literacy skills and thinking skills. The structured and constricted syllabus in the Science curriculum has to be changed to meet the demands of virtual learning in line with the required 21st century skills.

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