

# The Effectiveness of an Adaptive Web Tutoring Application based on User's Knowledge Level for Biology Subject

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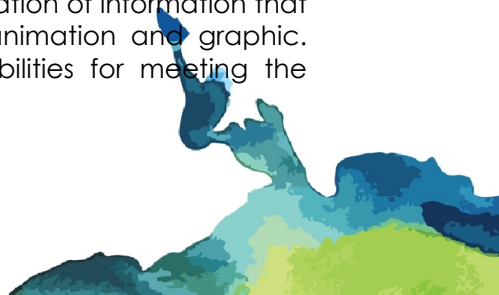
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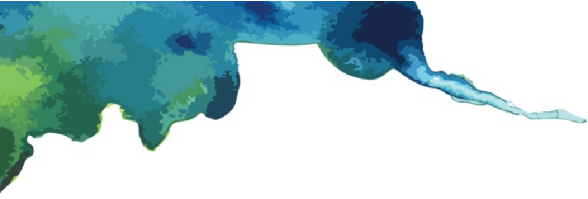
**Highlights:** Adaptive web tutoring application is a suitable approach to adapt the learner to its learning environment. Adaptation for web tutoring is based on modality and affective aspects of the learner. In this technology era, multimedia had become very important in our daily life in order to make our life more interesting. Hence, there is a huge influence of multimedia throughout the whole world which includes in education technology. This research project is about the research on an adaptive web tutoring system by using multimedia elements such as image, text, animation, video and audio for learning Biology. This system prototype which focus on photosynthesis topic will be used to test on a group of Form 6 students and the result will be compared to the conventional teaching method. T-test is used to conclude the results of both experiments to support the hypothesis. T-test result shows the effectiveness of adaptive web tutoring system compared to conventional teaching method effectively.

**Key words:** *Adaptive web tutoring, Multimedia web tutoring, Personalization, Biology Learning*

## Introduction

Multimedia is in nature a presentation of information that in contain text, video, audio, animation and graphic. Multimedia offers exciting possibilities for meeting the

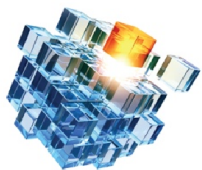




needs of 21st century learners. The use of multimedia in a statistically significant way can enhance student learning if using suitable designed and implemented (SEG Research, 2008). From past research, perception, selection, attention, organization and integration of information are multi process of human ability to process the information (Sweller, 2003). In order to make an education technology more efficient, the adaptive approach is introduce to make more personalize learning at anytime and anywhere (Rahmah, 2013; Phillips et, al 2013). Table 1 shows the comparison of implementing the traditional and computer based teaching tools. Adaptive web enhance the education in learning into more personalize approach to teach the student.

Table 1 Comparison of traditional teaching and computer based teaching tools

	<b>Traditional Teaching</b>	<b>Web Tutoring System</b>	<b>Adaptive Web Tutoring System</b>
<b>Learning Experience</b>			
<b>Learning Interventions</b>	Formal	Formal, Informal, and Social	Formal, Informal, and Social
<b>Learner Engagem ent</b>	Classroom, Desktop	Classroom, on-demand learning via web/mobile: anytime, anywhere, and on any	Classroom, on-demand learning via web/mobile: anytime, anywhere, and on any

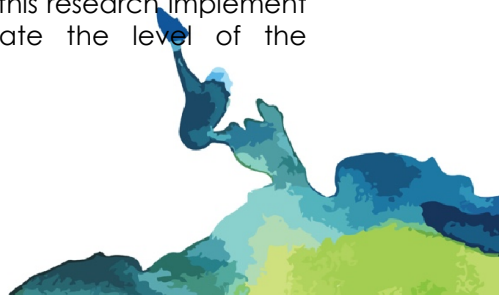


		device.	device.
<b>End User Tools</b>	Browse Catalogue , Simple Search, Email notification	Browse Catalogue, Faceted Search, Individual Development Plan, Dynamic Recommendations, Learning Paths, Email/Text Notifications	Browse Catalogue, Faceted Search, Individual Development Plan, Dynamic Recommendations, Learning Paths, Email/Text Notifications
<b>Content Publishing</b>	-	Print, responsive web (HTML5/CSS3), and mobile output templates or formats	Print, responsive web (HTML5/CSS3), and mobile output templates or formats
<b>Personalization</b>	No personalization	No personalization	Personalised based on .

*Source: amendment from Kraft, Monica (2014)*

### **Adaptive Web Based Tutoring Development**

Adaptive web based tutoring in this research implement user's knowledge to differentiate the level of the



students in perceiving the lesson in the web tutoring. The flow of the tutoring system can be referred to Figure 1.

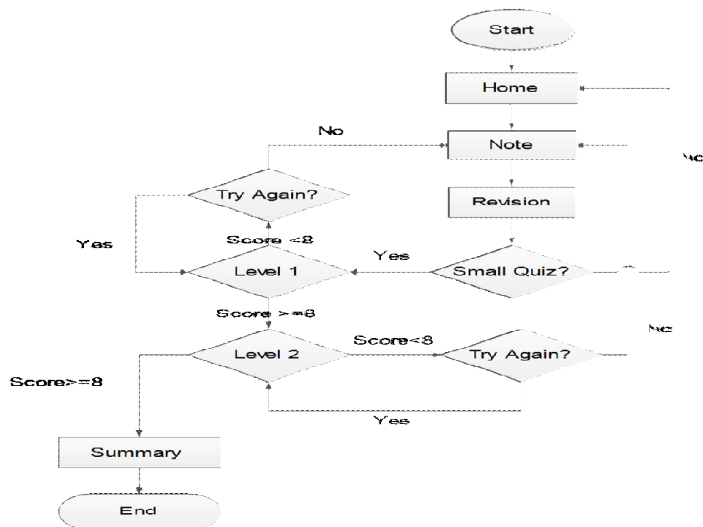


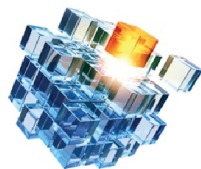
Figure 1. Tutoring System Flow

## Result and Discussion

This research came out with 2 hypotheses to test the effectiveness of adaptive web tutoring system. The hypothesis showed as below:

**H<sub>0</sub>:** Web-based tutoring by using multimedia elements is effective for students learning Biology.

**H<sub>1</sub>:** Web-based tutoring by using multimedia elements is not effective for students learning Biology.



**Table 2:** T-test Result

Variable	Test	N	M	SD	Mean Difference	t-value	df (v)	Level of significant
Control Group	C-Test	10	74.855	7.229	-10.431	-3.5789	17	0.05
Experimental Group	E-Test	10	85.286	5.717				

According to Table 1, the mean of the C-Test scores of control group (conventional method) is 74.855 with standard deviation 7.229 while the mean of the E-Test scores of the experimental group (web-based tutoring method) is 85.286 with standard deviation 5.717. These can show that the average scores of experimental group is much more higher than the control group. The mean difference of -10.431 is found to be significant at 0.05 levels for 17 degree of freedom. The difference between 2 population means with unknown population variances is identified by calculating its t-value which is -3.5789. On the other hand, according to the Statistical Table, the t-value with level of significant of 0.05 and  $v = 17$  is 1.7396. As a result, the calculated t-test = -3.5789 is smaller than statistical t-test = 1.7369, hence  $H_0$  is accepted. Based on the t-test, it is concluded that Web-based tutoring by using multimedia elements is effective for students learning Biology.





## **Advantages to Education and Community**

- i. Introduce the adaptive web tutoring in the education technology field.
- ii. Enhance the learning motivation, interests and capability to Form 6 students, thus will increase the value of excellent student, which will be giving it back to the community.
- iii. Increase community knowledge.
- iv. Implemented as one of the tools, especially for developing E-Learning content environment.

## **Commercial Values**

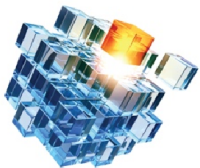
The technology introduces into adaptive web tutoring application can be sold to the E-Learning society and developer, where the process and technique can be adapted to all students with different learning level. Adaptive Web tutoring system with rich of multimedia elements can enhance learners' motivation towards their learning.

## **Acknowledgement**

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