

INTEGRATING QUIZLET FOR IMPROVING STUDENTS' UNDERSTANDING OF THE SCIENCE SUBJECT

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Received: 22/11/2018 Revised: 15/3/2019 Accepted: 2/5/2019 Published: 31/12/2019

ABSTRACT

Nowadays, educational institutions integrate the use of assessment tool due to its efficiency in engaging students during lesson. However, many teachers are still hesitated in integrating technology in classroom for many reasons such as lack of confidence in their IT skills, no exposure to the applications which are available online, time constraint and difficulties to change their current teaching method. Students however show their interests when exposed to new applications and they are keen to learn in an interactive environment which later could lead to better performance in the examination. To implement this, the teachers should keep up with students' preferences and they should understand that an assessment tool should be incorporated in class not just because it is fun, but also because of its ability to help teachers in improving students' learning outcomes. The purpose of this study was to determine the effect of Quizlet on students' achievement on Science subject and also to determine students' perception towards the use of Quizlet. A total of 77 form 1 students from four classes have participated in this study where their examination results of before and after using Quizlet in Science subject were taken. The result showed that there is a significant improvement in their Science subject achievement when using Quizlet. The survey result shows that the students' perception towards the use of Quizlet are positive.

Keywords: *technology integration, assessment tool, student's achievement, Web 2.0 tools, ICT in education*

INTRODUCTION

Science education is more important than ever to improve scientific literacy and to nurture the next generation of scientists. Scientific literacy is the key to help us digest the information we have gained in this fast-paced world. Learning science subject involves not only scientific content, but also scientific methodologies.

According to Dan, James, LaMoine and Sandra (2000), the primary science courses should focus on activities and self-study. Although the majority of science teachings happen in the ordinary classrooms, some schools are developing “discovery” rooms that integrate math, art and science activities. Students are bound to understand and accept new knowledge. When teaching new knowledge, teachers should pay more attention to adopting activities that attract students and to guide them to enjoy the course and improve their ability to accept the new things.

Nowadays, Web 2.0 tools offer interesting ways to assist students’ learning. It is not only to arouse students’ interest, but also to make the teaching and learning process more practical and easy to handle. It has been noted by Pano Savvidis (2016) that it is important to recognize that students are already interested and engaged in the use of technology, which could create many amazing opportunities for students and teachers to benefit from, by integrating certain forms of technology into the classroom and therefore making teaching more effective. As a result, combining science courses with technical tools to teach students is likely to have some positive effects.

Thus, in this research project, we integrated the use of Quizlet, an interactive Web 2.0 tool for facilitating students’ understanding of a Science concept. Then, we conducted a test on four (4) classes that consist of 77 students at one secondary school in Perlis, Malaysia to capture the impact of using Quizlet on students’ learning. The essence of using examinations and other evaluation tools in the teaching process is to guide, direct and supervise the students’ learning and progress towards the goals of the course (Adekunle Thomas Olutola, 2016). Students’ examination results before the use of Quizlet has been used in order to determine whether using the assessment tool has helped them to score better results specifically in Science subject.

LITERATURE REVIEW

Science education is a subject that imparts basic scientific knowledge as its carrier and allows students to experience scientific thinking methods and explore scientific practice. It can cultivate students' scientific spirit and attitude, help them establish a complete view of scientific knowledge and values, and finally enable students to conduct basic scientific research ability training and skilfully use science and technology. However, Science education is often treated as a so-called "elective course" by many schools and teachers, thus weakening the importance of Science education. After a thorough review of Science education in many countries, we found some problems related to educational concepts, educational behaviours and teaching methods in Science, as discussed next.

At present, many countries only emphasize the teaching of scientific knowledge and do not care about the cultivation of scientific quality. Science subject is a course aimed at cultivating students' scientific literacy and cultivating students' scientific spirit of independent thinking, diligence, practicality and innovation. Hodson (2014) believed that almost many teachers emphasize "knowledge points" and require students to master what knowledge or how much knowledge. This is obviously not in line with the overall goal of Science education.

Science education in primary and secondary schools is a kind of enlightenment, focusing on stimulating students' understanding, interest and exploring desire. Teachers should create conditions for students to participate in inquiry activities and feel the process and methods of scientific inquiry. However, when learning about students' scientific activities, many teachers tend to focus on results and are eager to tell the students the answers. This answer is not the result of students' hands-on thinking. Davson-Galle (2004) believed that the process of students' self-discovery is a process of independent thinking and independent exploration. Therefore, if teachers give direct answers, students may lose the opportunity to think.

In this study, we started with a belief that everything that students can see, touch and understand can be used as the content of students' practice as long as there is no danger. Teachers should take students

out and go directly to nature to observe, explore and find answers, instead of having teachers prepare pictures and materials in advance to interpret the world by themselves. Science in primary and secondary schools is a multi-disciplinary and multi-content comprehensive course. In addition to the necessary scientific knowledge, teachers should have extensive knowledge in the fields of physics, chemistry, biology, astronomy and geography. Only in this way can we adapt to the needs of science and realize the independent development of students.

There are many ways teachers can do to enhance their teaching and learning experience and one of them is by using online assessment tool during lessons (Baleni, 2015). There are many applications available on the internet, namely Kahoot, Mentimeter, Quizalize, Socrative, Classflow, LessonUp, Flipgrid and the list continues as time goes by, and what teachers have to do are to explore several applications and find the best one that suits them. By doing this, teachers can ensure that the use of technology in their classrooms will be meaningful (Sailin & Mahmor, 2018) in terms of improving students' results and at the same time, increasing their motivation for learning (Pacharn, Bay, & Felton, 2013). Generally, these tools are convenient, most of them are free (though some require small amount of subscription fee), and easy to use even for the first-time users.

Studies have shown that information and technologies (ICTs) can support cognitive development essential for deep learning, but still in many science education programmes, students spend more time learning in regular lecture halls and exposed to traditional teaching environments (Jimoyiannis, 2010). In this digital era, future teachers should get the opportunity to learn with as much as technology tools available in the market, in order for them to understand the effectiveness of technology integration and woven it into their own classes.

Science subject in particular, has many opportunities to include technology in its learning and teaching processes since there is a wide range of efficient educational applications available. They include the simulations and modelling tools, web resources, and assessment test, which offer a great variety of affordances for both students

and teachers (Jimoyiannis, 2010). For example, using simulation method is good in helping students to build conceptual understanding of abstract concept, while online discussion encourages students to participate and analyse the topic deeper. However, not many teachers intertwine these two elements into their teaching and they tend to be less positive or convinced about their potential to improve instruction (Jimoyiannis, 2010). They know about the benefits of technology integration in the classroom, yet refuse to do it and keep on focusing on the content traditionally.

Technology, in one form or another, has always been part of the teaching and learning environment. It is part of the teacher's professional toolbox. In other words, it is among the resources that teachers use to help facilitate student teaching (Eady & Lockyer, 2013). So, we believed that an effective tool that could help the students to have better understanding of a subject matter is the enhancement of word memory ability booster. In this article, we will first introduce a representative tool – Quizlet, then discuss the main features of that. Finally, we will illustrate how Quizlet work in improving students' understanding and motivation.

Quizlet is a vocabulary-learning application that includes a wide range of models that can test the knowledge base of users, especially the function to create and classify online memory CARDS that has gained popularity. In addition, Quizlet can be used to remember words, phrases, and sentences as well as the knowledge of other subjects. Furthermore, users could choose to directly log on to the web or download this App on their mobile devices.

There are many unique features of Quizlet. Firstly, users can choose and design their own recitation materials. Secondly, it provides an attractive learning process, which is divided into two parts: study and play. In terms of study, there are four aspects, including Flashcard, Learn, Spell, and Test. Flashcard, is a word card study exercise which lets the users acquire knowledge of the word first, that is, they can recognize the word whether they see it or hear it. By touching a word card, the student will be able to see one side of it which contains the word to be learnt, and by touching it again to see the other side which contains the definition or explanation of the word. The Learn

section of the Quizlet is divided into multiple rounds, depending on the students' acquisition of the words. Correctly spelled words do not reappear in the next round, but misspelled words reappear repeatedly until the student can correctly spell them. The essence of the Spelling section is dictation, which requires the student to listen to the word and then spell it correctly. Finally, the Test section, automatically generates test questions to assess the students' mastery of the word list, which is a useful way to help the students detect their own learning. Interestingly, they can choose the test types from the list of tests modes which includes spelling, pairing, multiple choice, and judgment.

Quizlet has a dramatical influence in stimulating the learning efficiency and motivation. As noted by Gray (2006), humans master new things and knowledge depending on how well the human brain accepts them. Similarly, Gathercole, Service, Hitch, Adams & Martin (1999) claimed that when people's brains are actively receptive to new knowledge, it often works much better than when they are passively receptive. Therefore, Quizlet takes advantage of this feature of human memory in its functional Settings. For example, in the flashcard feature, the CARDS are set to explain words on one side, rather than to set both explanations and words on one side. This is because when explanations and words appear on the same side, students tend to passively explain knowledge without deep thinking, which is not conducive to students' memory of words and understanding of the meaning of words. Meanwhile, when students see individual words, they will gradually associate the meaning behind them. This is much more efficient than the traditional model of teaching students the words and meanings by rote. In addition, it is believed that repetition is the most effective method for long - term memory (Michas & Henry, 1994). For this reason, the learning function of Quizlet assimilates the memory processes, helping students to deepen their memory.

Quizlet brings the following two points together. Firstly, students can design their own learning content according to their actual situation, so as to avoid the boring learning process caused by the paradigmatic learning content. Secondly, in the learning process, by setting up the play part, the uninteresting learning process is turned into an interesting game form, so as to increase the learning enthusiasm of

students. Finally, in the test section, students can still choose the test type by setting it and even print the electronic test questions according to their needs. At the same time, the final test results can give students an intuitive result and let students know their learning outcome.

Additionally, Li (2010) emphasized that the diversity of learning styles plays a positive role in promoting the learning effect. In our opinion, the most obvious characteristic of Quizlet is diversity. Firstly, in terms of purpose of learning, in order to make Quizlet meet everyone's needs, it does not set fixed learning templates, and students can make learning plans according to their own needs. This is not only convenient for students to use, but also can effectively improve their efficiency of vocabulary learning. In terms of process, Quizlet does not simply set word memorization process into word CARDS but divides the learning process into different stages and different learning forms. The differently staged feature helps students to deepen their content learning, while the different learning forms enhance students' enthusiasm for learning. In conclusion, as an effective learning tool, we belief that Quizlet plays a positive and significant role in helping students to deepen the understanding of vocabulary meaning. This study therefore is conducted to achieve the following objectives:

1. To analyse the impact of using Quizlet on students' achievement in Science.
2. To explore student's perception towards their experience in using Quizlet as a learning tool.

METHODOLOGY

This study employed a mixed-methods study design (Halcomb & Hickman, 2015). In this study, we have included the pre and post –test, as well as two types of survey which are simple questionnaires and open-ended feedback.

This study took place at one public secondary school in Perlis, Malaysia. The entire school has about 600 students. This school runs on a normal day school operation, starting from start from 7.50 a.m to 2.30 p.m, Friday to Monday every week. The population of the studies covers four out of six form 1 classes. The four classes consist

of 18, 21, 21 and 17 students, respectively. In total, 77 students were involved in the Quizlet online assessment tools.

The Quizlet study sessions were carried out in the computer laboratory equipped with an internet connection. Each selected class runs 5 sessions of Science subject every week. Each session lasts for half an hour, therefore, in total, students spend two hours and thirty minutes for Science subject every week. In addition, several Quizlet sessions were also conducted as preparation to sit for the examination.

Assignment

The selected students were instructed to revise the subject using flashcard features in Quizlet. The teacher closely assisted the students during this session. They were then asked to revise this subject using the Quizlet's 'learning' features. At the end of the class, the students were required to do assessments using the Quizlet live, individually and by group.

Pre-test

We gathered information from the students' mid-year examination results for the Science subject as the pre-test result. Their marks from the examination were taken to make a comparison with the post-test result later on. The mark was intended to measure the performance of the selected form 1 students before making revision using the Quizlet online assessment tool.

Post-test

The final examination marks for Science subject were gathered as their post-test result. This result was intended to examine the student's performance after revising the science subject using Quizlet. The researchers were interested to analyse whether the final result showed improvement, no improvement or the opposite.

Survey

At the end of the class, the participating students completed a survey regarding their perception towards using Quizlet in learning, revising

and assessment session. The survey used was a simple questionnaire with a Likert scale format and open-ended feedback. The questions in the survey are concerned with how Quizlet facilitate students in their study and revising for the final examination.

Another survey used is open-ended survey. Students were instructed to provide their own opinion after experiencing the Quizlet tools in learning and revising the Science subject. Two question were asked. First, about their feeling after experiencing the Quizlet and second, about what they have obtained from class that involved Quizlet as their learning tools.

FINDINGS

Pre-result and post-result of students that using Quizlet

A paired sample t-test was conducted to compare pre-result and post-result of students using Quizlet. Based on Table 2, the paired t-test show significant difference between pre-result and post-result ($p < 0.05$, $p=0.002$). Paired t-test is significant [$(76)=3.227$, $p=0.002$ ($p < 0.05$)]. Therefore, we can conclude that there are statistically significant different in student's achievement on Science before and after using Quizlet. The pre-result ($M=38.8$, $SD=8.022$) and the post-result ($M=34.48$, $SD=16.961$). These results suggest that use of Quizlet has affected the students' learning.

Table 1

Result for The Use of Quizlet for Improving Student's Achievement in Science

Test	N	Mean	SD	df	t	p
Pre	77	38.83	8.022	76	3.227	.002*
Post	77	34.48	16.961			

* $p < 0.05$

Students' Perception towards Quizlet

At the end of the study, the students completed an anonymous Likert Scale type survey on their perceptions of using Quizlet in terms of facilitating the teaching and learning process. A choice of five responses were afforded ranging from 1 to 5, with 1 representing “strongly disagree”, 2 “disagree”, 3 “neutral”, 4 “agree” and 5 “strongly agree”. No names were written on the survey to maintain student confidentiality. Percentages of student responses are presented in Table 2.

Table 2

Student's Perception towards Quizlet based on Likert Scale

Items		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	SD
Pre-Understanding	N	2	3	29	11	1	3.13	0.749
	%	4.3	6.5	63.0	23.9	2.2		
Familiarity	N	21	5	7	5	8	2.43	1.573
	%	45.7	10.9	15.2	10.9	17.4		
Assistance	N	-	1	1	15	29	4.57	0.655
	%	-	2.2	2.2	32.6	63.0		
Post understanding	N	-	-	11	25	10	3.98	0.683
	%	-	-	23.9	54.3	21.7		
Practicality	N	3	9	18	8	8	3.20	1.147
	%	6.5	19.6	39.1	17.4	17.4		
Interesting	N	-	3	-	8	35	4.63	0.799
	%	-	6.5	-	17.4	76.1		
Continuity	N	-	1	3	5	37	4.70	0.695
	%	-	2.2	6.5	10.9	80.4		
Appealing	N	1	2	3	-	40	4.65	0.948
	%	2.2	4.3	6.5	-	87.0		
Total							3.91	0.91

N = No. of responses, SD = standard deviation

Overall, it shows that students have positive perceptions towards Quizlet (M= 3.91, SD= 0.91). The result shows that there are four items that have the highest mean score which is from 4.00 to 4.99. The items are as follows: teachers have to continue using Quizlet in the teaching and learning process (M=4.70, SD=0.695); students find Quizlet appealing for activities purposes (M=4.65, SD=0.948); Quizlet is interesting (M=4.63, SD=0.799); Quizlet can assist students in the learning process (M=4.57, SD=0.655).

Open-ended Survey

Students' feedback on the perception of Quizlet were also gathered by using an open-ended survey. There were two open-ended questions they have to answer. The questions were 'What is your feeling after learning the Science subject using Quizlet?' and 'What have you obtain from today's class?' Most of the students gave positive feedback on their experience on learning and revising the Science subject using Quizlet.

In terms of student's feeling after learning the Science subject using Quizlet, most of them responded that they had fun and felt happy in using Quizlet. Nevertheless, some of the students felt a sense of competition in using Quizlet and had the urge to revise and learn the science subject. Some of the extracts of the student's responses are as follows:

Themes	Examples
Fun	<i>I feel fun.</i> <i>Very fun because I can study by using computer.</i> <i>Fun and this should be done every day.</i> <i>I feel very fun.</i> <i>Fun and easier to understand.</i> <i>I have fun playing and understanding</i> <i>I have fun playing.</i> <i>I have fun playing in groups.</i>
Happy	<i>I feel very happy and fun with our activity today.</i> <i>I am happy because I can learn while listening to the music.</i>
Competitiveness	<i>I hate those who win in the Quizlet Live.</i> <i>I'm so happy that our group win the competition.</i>

In terms of student's learning, student responses indicated that they improved their Science knowledge and the use of Quizlet also helped them in revising, comprehending, and memorizing the science subject. Some of their feedbacks on these themes are as follows:

Themes	Examples
Comprehending	<i>More understand.</i> <i>Easier to remember and understand.</i> <i>Get to understand more about Science.</i>
Knowledge	<i>Gaining more knowledge.</i> <i>Helping us to be more knowledgeable.</i> <i>Get to know more about the topic taught.</i> <i>Get to strengthen my knowledge and learning new thing.</i>
Revising	<i>Get to revise more precisely.</i> <i>Able to do some revision.</i>

DISCUSSION

This study has found that there is an improvement in the student's achievement in the science subject by using the Quizlet application. This is consistent with studies conducted by Plump and LaRosa (2017) who apply the Kahoot gamification tool; and Marino, Israel, Beecher and Basham (2012) who use video games to learn science subject rather than traditional teaching approach. These studies found that when students are having fun in using interactive tools, they are more motivated to learn the topic.

This study has also found that students reported positive feedback towards the use of Quizlet in assisting their science learning. This is consistent with Gorres-Martens, B.K., Segovia, A.R. & Pfefer (2016) who found that the majority of students who used Quizlet in the semiflipped teaching model felt that it helped them do well on the quizzes and exams.

From the open-survey feedback we found that most of the students gives positive response on their perception in using Quizlet for science subject. A similar result can be seen with Kaya & Balta (2016), and

Bullon et al (2018) where most of the students give positive feedback after experiencing Socrative application in learning English language and Mathematics. Most of the students find Socrative application fun and helpful in learning. Our result is also compatible with Bicen & Kocakoyun (2018) on using Kahoot for Preschool Teaching in which the students provide positive responses to show that they are contended that this type of application is helping them to gain better understanding and excite them more to come to class.

REFLECTION

We started this research with a belief that effective tool could help the students to have a better understanding of a particular subject or topic. Thus we introduced the Quizlet as an enhancement tool. This study was conducted in one of the researcher's classroom and thus provided us with the opportunity to reflect upon the learning process from the teacher's perspective. Despite the students' positive feedback toward the use of Quizlet, the teacher also found that the students' were more motivated to learn the Science subject when they were introduced to the tool. The teacher first felt that it was a bit overwhelming to integrate the Quizlet in the classroom as she had to arrange the lessons in the computer lab, for all four classes during this study, and prepare several study sets using Quizlet for the entire study. However, when the students showed their interest, the teacher felt motivated to continue the lessons using Quizlet. Other researchers in this study helped the teacher in terms of developing the study sets in the Quizlet, acted as "critical friend" and "member check" during the data collection (survey) and for the analysis and discussion of this study. All researchers in this study are teacher educators, but from different subject areas who found that this study is a good example of teachers' technology integration practice and can therefore be replicated in our own teaching areas. Further study is to be conducted in the use of Quizlet in other subject areas.

CONCLUSION

This study examined 77 students' achievement on science concept and their perception on using Quizlet. Two major findings were

determined. First, students show improvement in the science subject result after using Quizlet, and second, students have positive perceptions that Quizlet does assist them in studies. It means that with consistent use of Quizlet and probably other related assessment tools, the students' interest, attention and learning will definitely improve in the long run. However, the small number of participants limits the findings, and it cannot be generalized to larger Science student populations. Future research should consider a bigger sample size and the sample be grouped according to levels of intelligence to get a deep understanding on their performance and level of acceptance towards Quizlet or other assessment tools. Further study should also consider using Quizlet in other subject areas.

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