THE EFFECTS OF COOPERATIVE LEARNING ACTIVITIES IN BLOSSOMS LESSON TOWARDS STUDENTS’ ACHIEVEMENT IN LEARNING CHEMISTRY

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Chemistry is often considered by students as a difficult subject because it has many abstract concepts which are difficult to understand. Therefore, with the advancement of technology, teaching methods have integrated multimedia elements such as video to help students to understand abstract concepts in Chemistry. Thus, the project named Blended Learning Open Source Science or Math Studies (BLOSSOMS) was introduced in 2010 by Massachusetts Institute of Technology (MIT). It is a teaching and learning method which integrates the use of video for the purpose of blended learning. BLOSSOMS allow students to actively involve in their learning either individually or in groups to solve problems raised in the video. Therefore, the aim of this study was to design cooperative learning activities in BLOSSOMS by integrating Johnson, Johnson & Smith (1991) principles and further investigated the effects towards students’ achievement. “Why neutralize” was the BLOSSOMS video selected to be used in this study. It covers the neutralization concept which is a result from the reaction of acid and base. Findings showed that students’ achievement increased after learning using the BLOSSOMS video. In addition, the integration of cooperative learning in the activities helped to make the learning process enjoyable for the students.

**Keywords:** BLOSSOMS, Cooperative Learning, Blended Learning, Achievement, Chemistry

1. INTRODUCTION

The development of Information and Communication Technology (ICT) in the current era of globalization requires the mastery of ICT in the process of teaching and learning in Malaysia. Thus, a project named Multimedia Super Corridor (MSC) was announced by the former Prime Minister, Datuk Seri Dr. Mahathir bin Mohamed at the opening of Multimedia Conference Asia on 1st August 1996. The effort signified that Malaysia is taking the initiative to be part of the multimedia world and subsequently equip Malaysians to face the information age. Previous studies by Russell (2003) indicated that educators are adept at using technology and more likely to use it as a medium of instruction in the classroom. According to Rusmini (2003), interactive materials which were developed using multimedia elements such as graphics, text, music, video and animations could help to strengthen students’ understanding of concepts. In addition, Nancey (2012) claimed that 21st century learners are highly relational and demand quick access to resources such as video technology.

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As online video continues to boom, the trend of using video as one of the teaching materials for example Teacher Tube is slowly gaining popularity among educators. In addition to that, Blended Learning Open Sources Science or Mathematics Studies or known as BLOSSOMS was launched in 2013 by Massachusetts Institute of Technology (MIT). This project started when a professor of engineering systems at MIT and an early advocate of educational technology, visited a run-down school in rural central China which emphasized learning using video through blended learning. They envisioned video lessons dovetailed with engaging activities for teachers to do with their students. Consequently, this project gave impact on the teaching and learning process in Science and Mathematics. Zaleha and Nurbiha (2016) mentioned that BLOSSOMS has a unique pedagogical approach intended to foster students’ interest and help teachers to be more effective. Besides, according to Annie (2014), BLOSSOMS adopts exciting and effective use of educational technology in order to help students learn Sciences and Mathematics. BLOSSOMS videos allow full engagement of students and also teachers.

Therefore, this study aimed to investigate the effectiveness of a BLOSSOMS video towards students’ achievement. The video named “Why Neutralize” was selected to be used in a Chemistry lesson. One of the reasons of choosing this video is students often regard the topic of neutralization as difficult. Furthermore, in order to make the process of learning become active and enjoyable, cooperative learning activities were also integrated in the classroom.

2. PROBLEM STATEMENT

One of the barriers which students face when learning Chemistry is misconception and difficulties in memorizing facts and formulas. Studies by Johnstone and Al Shuaili (2001) stated that traditional classes for Chemistry students where they followed a prescribed experimental procedure over a set time were the backbone of most Chemistry courses but the level of learning is limited. In addition, students were unclear of the learning aims and unsure of what the results mean or how they could apply the theory learned. Norhasniza et al (2014) added, many chemistry teachers usually apply traditional teaching style without integrating appropriate teaching approach such as inquiry based learning. Implementation of active teaching strategy enables students to think critically. Therefore, many educators try to replace the traditional teaching style by applying active teaching strategies with integration of technologies in their classrooms such as using animation and videos.

However, even though many studies have indicated that video technology can widen educational opportunities, many teachers refuse to implement video as a tool to make the learning process more interesting. This may due to the fact that they are not aware of how learning environment are likely to change through video integration in the classrooms. In fact, Naido, Cunning, & Jasen (2002) emphasized
that teachers did not have ample knowledge about the miracle of integrating video technology to the teaching practices.

Moreover, when focusing towards implementing BLOSSOMS video in classroom, Colleen (2010) claimed that much of the available literature merely focuses on two areas: (a) learners’ achievement after implementing BLOSSOMS video and (b) evaluation of the technology program or tool integrated for teaching Chemistry in classrooms. Therefore, this study investigated whether BLOSSOMS video could influence students’ achievement in learning Chemistry by integrating cooperative activities by Johnson, Johnson & Smith (1991). In addition, this research aimed to provide educators a proper guideline to engage students actively while implementing BLOSSOMS video in class activities.

3. METHODOLOGY

This research used pre-experimental one-group pre-test – post-test design and involved 29 form four students from a school located in the southern region of Peninsular Malaysia. The study was established in three phases to fulfill the requirement of the research.

In phase one, a set of pre-achievement test was carried out to all the students. Then, the researchers conducted phase two whereby the process of learning using BLOSSOMS video was implemented. The activities integrated cooperative learning approach by Johnson, Johnson & Smith (1991) who highlighted five principles which are a) positive interdependence, b) promotive interaction, c) individual and group accountability, d) interpersonal and small group and e) group processing. During the BLOSSOMS lesson, students needed to complete and for each of the activity, students worked in groups to solve the tasks given. After students completed all the 6 activities, the students sat for a post neutralization test (Stage 3). The research procedures are illustrated in Figure 1.

4. DATA ANALYSIS

To study the effectiveness of cooperative learning activity in BLOSSOMS lesson towards students’ achievement, a paired sample t-test was used to answer this objective. Table 1 confirmed statistically the significant difference between the mean of the students’ achievement in the pre and post Neutralization Achievement Tests. Since the $p$-value was less than 0.05 ($p < 0.05$), thus $H_0$ was rejected. Conclusively, BLOSSOMS video lesson had significant effect on students’ achievement in learning Chemistry especially in Neutralization subtopic.

5. DISCUSSION

From the data analysis, there was significant difference between mean of the students’ achievement in the pre and post achievement tests. This result indicated that BLOSSOMS video lesson promoted positive effects on students’ achievement
in learning Chemistry. This finding was parallel with the research by John (2013) which found that learning by media technology in classroom such as videos, animations and online materials increased students’ achievement in learning the content. Furthermore, Richard (2006), a professor of engineering systems at MIT who is an early advocate of educational technology in BLOSSOMS video found that, after a few minutes he played a BLOSSOM video lesson in a classroom then,
he paused the video and tried to engage with his students, surprisingly the lesson became more interactive and dynamic during the questioning and answering session.

Next, according to Salman Khan (2011) blended learning especially digital learning tools can make room for teachers and students to embrace more real-life creative learning experiences and can help classrooms become hubs for hands-on experiences. Therefore, BLOSSOMS video lessons are carefully crafted to make sure that teaching and learning sessions come alive and can maximize students’ engagement towards the lessons. Hence, every BLOSSOMS video lesson is made up with a complete resource which includes video segments and each activity in every segment allows students to engage with their group members to discuss briefly the task given by the teacher and followed by implementing hands-on experiences in groups. In addition, every BLOSSOMS video lesson is also made up with a teacher’s guide, downloadable hand-outs and a list of additional online resources relevant to the topic which helps students to understand better and indirectly enhance students’ achievement towards Chemistry.

This study also integrated cooperative learning in the chosen BLOSSOMS video lesson in order to promote group work among students. Group work can maximize students’ interaction and engagement with peers while doing activities. From the data analysis it can be concluded that active learning happened when cooperative learning was implemented during the break activities. This notion supports the statement by Joanna Poon, (2012) who stated that by enhancing the students’ learning experiences and cooperative engagement in classrooms through blended learning; students could be better. Undoubtedly when students enjoy their activities, their level of motivation increases and this can influence their achievement. As mentioned by Nurul Izzati and Norasykin (2014), students’ motivation can be enhanced after engaging in BLOSSOMS lesson. Thus, it can be concluded that BLOSSOMS lessons can be successfully conducted if it integrated with a learning strategy such as cooperative learning. Table 2 below shows how the five principles of cooperative learning were implemented during the BLOSSOMS lesson.

**TABLE 2: IMPLEMENTATION OF COOPERATIVE LEARNING PRINCIPLES IN BLOSSOMS VIDEO LESSON ACTIVITIES**

<table>
<thead>
<tr>
<th>Cooperative Learning Principles</th>
<th>Implementation of the Principles in BLOSSOMS Video Lesson</th>
</tr>
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<tbody>
<tr>
<td>Positive Interdependence</td>
<td>This principle was applied when students conducted Activity 1 where they were required to construct an inference drawing from certain observed or supposed facts based on the situation shown in the BLOSSOMS video lesson.</td>
</tr>
<tr>
<td>Promotive Interaction</td>
<td>This principle was applied when students conducted Activity 6 where they had to evaluate arguments on how</td>
</tr>
</tbody>
</table>

*contd. table 2*
Cooperative Learning Principles | Implementation of the Principles in BLOSSOMS video Lesson
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Johnson, Johnson & Smith (1991) | neutralisation plays an important role in our life and how neutralisation helps to enhance the quality of our health and protect the environment.

Individual Group Accountability | This principle was applied when students conducted Activity 3 where they were required to write equation for some neutralisation reactions.

Interpersonal and Small Group Skills | This principle was applied when students conducted Activity 2 where they were required to conduct one experiment – Reaction of suspension of Magnesium Hydroxide with Hydrochloric Acid (Milk of Magnesia)

Group Processing | This principle was applied when students conducted Activity 4 where they were required to draw a mind map on the use of neutralisation in daily life – house, factory, farm and clinic. This principle was also applied when students conducted Activity 5 where they were required to discuss in groups on the impact of neutralisation on health and environment.

6. CONCLUSION

In conclusion, the purpose of this research was to implement cooperative learning activity by Johnson, Johnson & Smith (1991) in a BLOSSOMS video lesson and also to study the effect of cooperative learning activity in the BLOSSOMS lesson towards students’ achievement. A BLOSSOMS video lesson entitled “Why Neutralize?” was selected since the subtopic is in the Chemistry Form 4 syllabus. The findings of this study indicated that there was a significant difference in students’ achievement and therefore BLOSSOMS video lesson is suggested to be used by teachers when they need to cover abstract concepts or concepts which are difficult to be delivered. In conclusion, BLOSSOMS video which integrated cooperative learning activities can provide active lessons to students and further increase their understanding towards the topic.

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