Online Brainstorming Learning Technique Increases Innovation in Students' Understanding

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Abstract - This research aimed to study students' understanding in Innovation Subject through online learning. This two months quasi-experimental quantitative study focussed on students' understanding of the subject through online learning brainstorming technique. Samples are 16-year-old students from two secondary schools; 36 students from School X, which is the experimental group and 40 students from School Y, which is the controlled group. Students from School X went through the treatment (online learning) while students from School Y went through traditional classroom learning. A total of 76 (36 +40) Form Four students from both schools sat for the pre-test and post-test to measure their understanding of the subject. Results from t-test has shown that there is a significant difference of mean score between those two groups. The group of students who underwent the treatment (online learning) has higher understanding of the subject. This showed that online learning has successfully increased students understanding of the subject, aligned with the government's wish and education blue print, which is to produce outstanding citizens.

Keywords – Brainstorming, Online, Innovation, Achievement

I. INTRODUCTION

Education system has changed drastically throughout these years as an effect of globalization and rapid technological advancements. This evolution has impacted both in developed and developing countries and could be seen through the different learning methods and techniques being introduced to the world. Among the focus in learning development process is cognitive skill, psychomotor and affective. These processes are vital for the students to grasp to survive in this 21st century, especially in instilling value in students' lives. Therefore, Innovation subject was introduced to Malaysian students with the vision of producing imaginative, creative, and inventive generation who will contribute towards our country technology development.

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Moreover, this subject aimed at producing students who are aware of the environmental problem, interested in entrepreneurship, patient, dedicated and competitive. In order to excel in this subject, students require different skills; 80% of it is cognitive skill. They need to figure out the theme, select suitable projects, rationalise in material and sources selection, and refine the project ideas. The balance of 20% would be for psychomotor; drawing skill and sketching is not less important in learning Innovation. Current teaching approach has a lot of flaws, specifically, lacking on promoting thinking skills. (Rainal, Ruzaika, Jaffri, & Muhammad Firdaus, 2016). Innovation requires cognitive, cooperative and positive thinkers. Thus, online brainstorming could be a good platform for the students to solve problems in learning the subject. This research aimed at discovering the impact of online brainstorming technique among Innovation students towards their understanding of the subject.

II. PROBLEM STATEMENT

Teaching and learning the subject Innovation is quite challenging as you need to make the students think out of the box to produce innovative products. Unfortunately, the existing teaching approach used in the classrooms only focusses on sketching and creating product, which only taps on psychomotor skill and not cognitive skills which is more important. This outdated approach is less impactful consequently causing teachers to remark students' products as stereotype. Because of teachers' perception, students are seen as not contributing much to creative ideas and perceived as unable to think critically and not motivated in learning. Students are mostly spoon fed by teachers and it is such a waste not being able to nurture them with thinking skills. To make things worse, even their test scores do not show that they are excelling in this subject. Second factor is teachers do not have sufficient face to face time with their students. They have so many things to explore yet too little time to spend. They become frustrated and demotivated; thus, the approach being suggested by the government is not being implemented. With the industry revolution, students should be exposed to the Education 4.0 skills to survive. Hence, drastic change need to be done to change the experienced teachers' 2 perspectives and teaching approaches. They must change their mind set and teaching style to produce balanced human capital.

III. LITERATURE REVIEW

The founder of brainstorming is Alex Osborn (1953) He claims that individuals working alone to come up with ideas are less efficient than when the ideas are generated through brainstorming(Alshammari,2015). Brainstorming is a method which consists of implementation of gathering together where a group tries to find a solution to a problem by pooling all the ideas which are presented at the same meeting. This session has rules which serve as guides for knowledge and are not restricted at all. Teachers should clearly explain these rules for learners hence they should not experience obsession or self-censorship thus their self-esteem is not dented in these sessions. The rules are as follows: 1. Withhold criticism: while expressing their ideas, no one should criticise any idea presented by others, even if it does not make any sense. At the end of the session, opinions about diverse ideas will be surveyed. 2. Flying in dreams: during the session, members should put aside all restrictions of thinking. In fact, for creative thinking, one should trespass ordinary logic. 3. Focus on quantity: the more number of ideas, the easier their classification. 4. Documentation: each idea, should be recorded and revealed to others to see it. 5. Combine and improve ideas: the ideas which were recklessly presented are now revised and completed. (Emami, Najafipour, & Dehghan, 2013) Khan, (1997) defined online learning as the delivery of instruction to a remote of audience using the Web as the intermediary but as the it has become more pervasive, the learning theories around it has evolved and authors defined online learning not only as access to learning experiences, but a platform for potential of flexibility and participant interaction (Benson,2002; Carliner,2004; Conrad,2002; Ally,2004). Online learning is one of in trend learning approach as it can cater to a big group of students learning simultaneously wherever they are (Qiu, 2010). Young & Cho (2014) added that the students can be of any age and level of proficiency. The learning theories being emphasised in this research is cognitivism and we are also looking at effective communication skill and psychomotor. Cognitive approach is a mental process that changes into knowledge, understanding, memory, act, values and behaviour(Bhagwatwar, Massey, & Dennis, 2013). Brainstorming ideas can train students' brain to think and polish their communication skills, henceforth instil added values such as being courteous with each other (Faste, Rachmel, Essary, & Sheehan, 2013). Michinov (2012) also added that students' psychomotor skill is utilised when students are capable to response politely based on their prior knowledge.

IV. METHOD

Research methodology is quantitative, using quasi-experimental approach. Two schools are involved in the research; school X is a treatment group while school Y is a controlled group. School X is being exposed to online brainstorming techniques while school Y is being injected with the traditional way of brainstorming. Pre-test and posttest were conducted with both schools.

Sampling

Research samples are being chosen randomly. 40 students from School Y (controlled group) and 36 students from School X (treatment group). The students are 16-year-old students who are taking Innovation as their elective subject at suburban schools.

Research Procedure

Two groups of students were picked randomly. Students from the controlled group, School Y is being exposed to brainstorming using the traditional way of teaching (face to face interaction in the classroom). They sat for the pre-test before they were introduced to brainstorming technique. After two months of exposure to the traditional brainstorming technique, the students were asked to sit for the post-test. Students from School X, treatment group, were exposed to online brainstorming technique for two months and went through the same procedure, students from School Y went through; pre-test and post-test. The teaching approach used was students were asked to download the application Telegram, Padlet and google drive (google doc). Each student need to have Gmail account to ease the process of creating group in google drive.

V. FINDING

Findings based on the hypothesis:

Hypothesis 1: There is no statistically significant difference shown between the achievement of the controlled group and treatment group in terms of understanding,

TABLE 1 COMPARISON OF PRE-TEST AND POST-TEST SCORES BETWEEN CONTROLLED GROUP AND TREATMENT GROUP.

Group	Pre-test				Post-test			
	N	Mean	SD	SEM	N	Mean	SD	SEM
Controlled Group	40	49.00	14.17	2.24	40	47.80	15.86	2.50
Treatment Group	36	46.44	13.79	2.29	36	75.11	14.72	2.45

Table 1 shows that there is no significant difference between the mean scores of controlled group and treatment group. For the pre-test scores, the treatment group has lower level of understanding compared to the controlled group. For the post-test, mean score for the treatment group (75.11) is higher than the controlled group (47.80).

Hypothesis 2: No statistically significant difference of the understanding achievement score between the controlled group and treatment group for the posttest.

TABLE 2 COMPARISON OF T-TEST RESULTS BETWEEN CONTROLLED GROUP AND TREATMENT GROUP FOR POST-TEST.

Test	df	t	sig	MD
Understanding	74	7.751	.000	7.311

Table 2 shows there is a significant difference between the controlled group and the treatment group (.000) value t = 7.751 with a degree of freedom at 74.

VI. DISCUSSION

Results have shown that there is a significant difference in the students' achievement between controlled group and treatment group. Both groups were introduced to brainstorming technique but with different approaches; traditional classroom and online. We could relate this to the theory and brainstorming technique which is, brainstorming is the platform to sharpen students' cognitive abilities henceforth increase the students' understanding of the subject. Moreover, online brainstorming technique has successfully overcome the issue of students' forgetfulness, that is the most challenging problem faced by both teachers and students. Thus, online brainstorming is a good platform for the students to solve problems in learning the subject.

VII. CONCLUSION

As a conclusion, researcher would suggest a few models and teaching approaches to the teachers in teaching Innovation. The existent teaching model is a non-relevant approach which needs to be modified and adapted to this era so that it will be more effective. Traditional face to face interaction versus online teaching should be put under consideration. Researcher believes that students cognitive skill is being explored by using online approach as it is continuous and borderless.

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