Effect of Divergent Thinking Models Based on Bitmap Graphical Sources towards Student's Achievement in Exploring Fact Essay Writing Content

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Abstract

The purpose of this research is to study the effect of divergent thinking models based on bitmap graphical sources towards student's achievement in exploring fact essay writing content. The quasi-experimental method was used in this study through quantitative research design. The sample consisted of 30 form four students of one of the schools in the Bangsar Zone, Federal Territory, Kuala Lumpur. This group of students was determined by the school itself. They are in the context of an intact group. The data were analyzed descriptively and inferentially. Descriptive data is mean and standard deviation. The data were also analyzed inferentially using ANCOVA. The result shows that the value of $F = (1,27) = 13.1$ with the significance level <0.05. This indicates that there is a significant difference between pre-test and post-test. In terms of implications, the model is particularly useful in the study of fact-writing for form four students. This is reflected through the improvement in student's achievement between pre-test and post-test.

Keywords: Divergent thinking models, Bitmap graphical sources, Achievements, Content of fact essays.

Contents

Contribution of this paper to the literature
This paper contributes to the literature review by searching of relevant information about higher thinking skill that based on interactive multimedia graphic for teaching essay writing. Specific model on divergent thinking that was developed in this paper can diversify and strengthen the growth of research in computer-based learning for writing skill. In line with 21th century of education, this paper identifying key questions and critical reviews about the application of interactive multimedia in the classroom that need further research.

1. Introduction

The field of information and communication technology is increasingly important in the country's educational development. This is because the function is effective in terms of integrating between the content of pedagogy and knowledge in the classroom. Integrated technology is the application of interactive multimedia sources (Adenan, 2018b). Teaching and learning sources that based on interactive multimedia technology are particularly important in this cyber age as they can have an impact on teaching and learning, as well as in line with the global trends in technology. In reality, teachers should act as facilitators in teaching, while students are focused on learning and problem-solving skills (Adenan, 2019a). Thus, interactive multimedia has been identified to serve as a vehicle for education, in addition to being active and dynamic teaching and learning. Interactive multimedia has been considered a special channel for teachers to apply dynamic sources to the classroom.

In general, it is not easy for teachers to provide appropriate teaching sources. The preparation of appropriate teaching sources by them requires attention from various angles. These include the curriculum requirements, student level, pedagogical choice and content of any topic to be addressed. According to Adenan (2019b) the content of technology content needs to be balanced with pedagogical and knowledge to be contested in appropriate contexts. It is inevitable that integration will make it difficult for teachers to measure the quality of knowledge that they want to convey to their students. Therefore, teachers also need to determine pedagogy, which is the way students think about the important of essay writing content. Under those difficulties, integrative should be applied in a study. The purpose is to enable students to think correctly and to gain knowledge of content for fact essay writing. According to Adenan (2019a) also, if students can think correctly and creatively, critical elements can be leveraged in the process of exploring knowledge.

In the context of creative and critical essays, common aspects of thinking need to be focused on the use of interactive multimedia graphical sources. According to Adenan (2019a) too, critical thinking needs to be studied in a balanced manner to suit creative and pro-active teaching.

1.1. Problem Statement

The most significant problems in the student essay can be traced back to the early stages of writing process. Adenan (2018b) argues that students find it difficult to handle content that is subjected to the requirements of such a topic. He further proved that many students write incorrect content, even overlapping. Adenan (2019b) argues that students fail to grasp the contents of the essay due to the improper use of a thinking model. Earlier, Hasnah (2016) argued that teachers who teach essays are too tied to conventional sources. As a result, student achievement in the overall essay is weak. Therefore, this study attempts to examine the effect of divergent thinking models that based on bitmap graphical sources on student achievement in terms of exploring fact essay writing content. The quasi-experimental method was used in this study. The study sample was form four students in one of the schools in Bangsar Zone, Federal Territory Kuala Lumpur. The data were analyzed descriptively and inferentially.

1.2. Research Objective

Two research objectives were formulated for this study. The objectives of the study are as follows:
i. To identify the achievement of form four students in exploring fact essay writing content before and after exposed to the divergent thinking models.
ii. To analyze the differences in achievement of form four students in exploring fact essay writing content before and after exposed to the divergent thinking models.

1.3. Research Question

Two research questions were formulated in this study. The research questions are as follows:
i. What is the mean score of form four student's achievement in exploring fact essay writing content before and after exposed to the divergent thinking models?
ii. Is there any significant difference in achievement for form four student in exploring fact essay writing content before and after exposed to the divergent thinking models?

1.4. Research Significance

This research has been of great benefit to the school. This study in a comprehensive way that impacts the use of divergent thinking model that based on exploring fact essay writing content. This study also provides additional input on the model application which refers to exploring fact essay writing content. With this, teachers can avoid any problems students may have, such as knowledge of exploring content with full guidance and accuracy.

The importance of this study is to encourage students to be more interested in learning that based on interactive multimedia sources. Student will be able to master writing on simple and complete concepts in a digital and virtual context. This study was conducted to support the school to teach future teachers training program which would require interactive multimedia applications for teaching and learning Malay Language in this cyber era.

This study is also very important for convincing Malay language teachers to apply new models of interactive technology. This research also generally contributes to the development of teaching and learning procedures, particularly those using Malay language. The possibility also can be incorporated into any topics in Malay

language. In reality, students are more likely to prefer digital and virtual interactive multimedia applications. As such, the application of such a model is certainly one of the teachers' needs in the process of teaching in the new millennium.

1.5. Research Limitation

This study is limited to three basic things: methods, samples, and data analysis. In terms of methods, the limits are to the experiment; pre-test and post-test. The sample was restricted to the national high schools. The study data were limited to mean, standard deviation and ANCOVA. The limitations of this study also include the use of divergent thinking models that based on interactive multimedia sources to explore the fact essay contents.

1.6. Operational Definition

1.6.1. The Bitmap Graphical Sources Based on Divergent Thinking Models

There are many definitions of divergent thinking. Jones and Estes (2015) define it as generating a broad set of associated concepts and categories, encompassing the abilities of forming loose associations, and fluency and flexibility of thought. In this study, divergent thinking operations are shown in Figure 1.
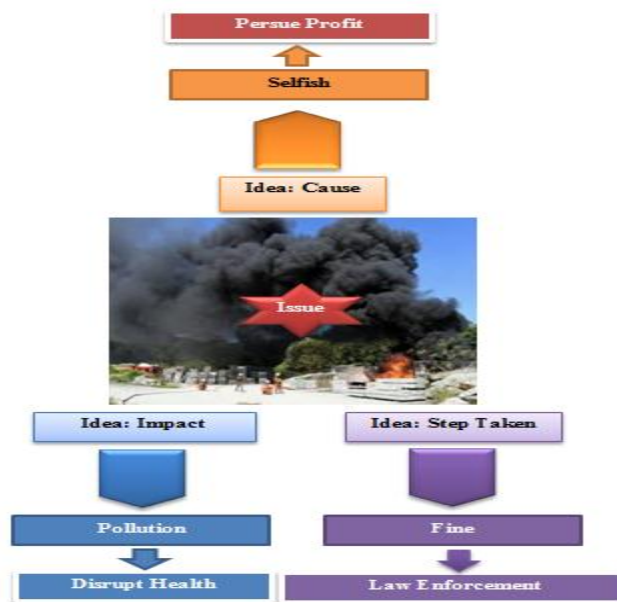

Figure-1. Divergent thinking operations.

In Figure 1, for this study, the operation of divergent thinking is an idea; causes, effects, and steps. Examples of issues that are presented in the form of bitmap graphics (accessed directly from Internet sources such as unmodified images) are about open burning. The cause of open burning, for example, triggers the idea of self-interest in pursuit of profit. The idea of an impact is that pollution that affecting health. The idea of step taken is to impose penalties by law enforcement.

1.6.2. The Basic Thinking Concept of Bitmap Graphical Sources

There are various basic interpretations of conceptual thinking that based on technological sources. Among them is Ansburg (2000) who interpreted the concept of divergent thinking as the number and variety of potentially relevant concepts retrieved is increased. For this study, the concept was adapted from Ansburg (2000) study itself.

Figure-2. Basic concept of divergent thinking.

Figure 2 illustrates the basic concept of divergent thinking. This concept is explained in via Figure 1.

1.6.3. Exploring Fact Essay Content

The exploration of the content of the fact essay is based on divergent thinking model. Content exploration is measured through pre-test and post-test. Both, tested student's fact essay writing content. For pre-test and post-test, the data was operated in the form of score.

2. Literature Review

2.1. Research Review

Interactive multimedia sources are widely studied. There are direct and indirect studies. Studies on essay writing are widely associated in the classroom. Some of the indirect studies are from the use of track changes, while the direct ones are from bitmap graphical sources.

This study attempts to examine the differences between direct and indirect findings that based on certain findings. Hasnah (2016) has provided an indirect focus of the study to examine the effects of teaching essay writing content via computers by using track changes. The purpose of using track changes based on interactive multimedia sources is to clearly show the mistakes that student make when writing fact essay content. The study was conducted on 28 form four students. The findings of his study show that students can reduce mistakes in writing essay content, and student can improve achievement for fully writing. Based on the analysis, she found that the mean for the number of errors in the pre-test was 16.6 and the post-test was 5, while the mean pre-test score was 53.3, and the post-test was 75.0. These descriptive mean clearly show the effect of using track changes indirectly improving student achievement in writing fact essay content. This proves that interactive multimedia sources are ideal for teaching essay writing holistically.

There is also a lot of other research on Internet usage. This research also attempts to study the use the Internet for interactive multimedia sources. Abbas (2012) stated that when using interactive multimedia, teachers need to learn how to put together tasks and materials to guide students to successful execution and conclusion of their learning. According to Ayob (2014) the use of information and communication technology is a new positive vehicle in teaching, besides enhancing student achievement. This also gives the impression that the Internet is a special necessity in teaching and learning essay writing (Adenan, 2018a).

3. Methodology

3.1. Research Method

The quasi-experimental method was used in this study. This method is used because the pre-test data is covariates. According to Creswell (2014) pre-test data is not biased when it is covariates. This method is shown in the research design as shown in Figure 3.
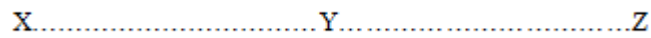

Figure-3. Research design for this study.

Legend:
X: Pre-test.
Y: Treatment via Divergent Thinking Model.
Z: Post-test.

3.2. Research Sample

For the purpose of this research, the sample of the study is the form four secondary school students. They were selected based on their age, class stream, and achievement in mid-year tests. They were selected because of group factors that the school has designated or named as an intact group.

3.3. Research Instrument

Pre-test and post-test are two research instruments for this research. Pre-tests are given before students are exposed to the model. Post-test is given after students are exposed to the model. Instructions for each test require the student to answer for 40 minutes; which is to write one essay. Both tests have also been tailored to the same structure and form of questions. All pre-test and post-test questions are standards because it is already tested in the year 2014, 2015, and 2016 in Malaysia Certificate of Education. Standard of measurement are based on Creswell (2014) view.

3.4. Data Analysis

The study data were analyzed descriptively and inferentially. The data that was analyzed are shown in Table 1.

Table-1. Data analysis.

No.	Research Question	Analysis
i.	What is the mean score of form four student's achievement in terms of exploring fact essay writing content before and after exposed to the thinking models?	Descriptive Data: Mean and Standard Deviation
ii.	Is there any significant difference in the achievement of form four student in exploring the fact essay writing content before and after exposed to the thinking models?	Inferential Data (Tested): ANCOVA

4. Result

The results of this research are based on two research questions. The results of the descriptive study are in Table 2. The results of the inferential study are in Table 3.

What is the mean score of form four student's achievement in exploring the fact essay writing content before and after exposed to the thinking models?

In answering this research question, data were analyzed descriptively. Descriptive data is the mean score and standard deviation of pre-test and post-test as shown in Table 2.

Table-2. Mean Score and standard deviation of pre-test and post-test.

Test	n=30	
	Mean	Standard Deviation (SD)
Pre	66.4	11.2
Post	85.8	7.6

In Table 2, the descriptive analysis shows that the mean of pre-test is 66.4 (SD = 11.2). The mean of post-test mean was 85.8 (SD = 7.6).

Is there any significant difference in the achievement of form four student in exploring fact essay writing content before and after exposed to the thinking models?

Table-3. The different of mean and standard deviation between pre-test and post-test.

Test	n=30		F	*Significant
	Mean	SD		
Pre	66.4	11.2	13.1	0.002
Post	85.8	7.6		

Note: *Significant level <0.05
SD is standard deviation.

In Table 3, the data tested involves pre-test and post-test. The results showed that F value $(1,27) = 13.1$, with a significance level <0.05. In these statistics, the pre-test was controlled by covariate. From the table, it is shown that there are significant differences between pre-test and post-test.

5. Discussion

In reality, the use of multimedia technology is very useful in learning of writing. The results of this study support the views of Hasnah (2016) and Bikowski and Vithanage (2016) that the use of multimedia technology in language teaching and learning can enhance student's writing achievement through interactive sources. Previously, a study by Truong and Zanzucchi (2012) showed that interactive multimedia sources assist students in smooth writing processes.

There are also other studies involving the use of interactive multimedia sources. Mueller and Jacobsen (2016) have studied effects of using interactive multimedia sources in improving the achievement of essay writing. Their finding shows that the integration of interactive multimedia sources can serve as a special guide to ensure the student achievement in essay writing is outstanding. It is undeniable by Mueller and Jacobsen (2016) including the significant findings from the research that an integrated online collaborative approach is strongly recommended. Supporting research by Iqbal and Muhammad (2015) has shown that multi-sensory that based on interactive multimedia stimulates many senses of the learners. The research findings also support by Sarimah (2015) learning via interactive multimedia technology in the 21st century is increasingly important and dynamic. It must be adopted systematically.

In addition, there are other studies that support the results of this research. Hasnah (2016) found that students can improve their achievement when mistakes in writing can be reduced. The findings of this research are also supported by Hasnudin, Norfaizuryana, and Nor (2015). According to them, information and communication technology can diversify writing activities during learning to cater student's creativity to produce high quality essay writing.

6. Conclusion

The use of interactive multimedia sources in essay writing should be practiced in teaching to stimulate affective, as well as easy for students to generate creative and critical thinking. Learning based on interactive multimedia sources, such as bitmap graphics is best implemented in the context of time flexibility, as well as adapted to global Internet access. As such, ongoing research on the use of interactive multimedia sources, in particular bitmap graphical should be culturally and physically active and practiced in the cyber classroom.

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