

Impact of Using Graphic Organizers on Interest and Performance of Junior Secondary School Students in Basic Science in Katsina Educational Zone

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Abstract: The study investigated the impact of using graphic organizers on the interest and performance of junior secondary school students in basic science in Katsina educational zone. Three objectives and corresponding research questions and hypotheses guided the study. The study employed quantitative methodology and a quasi-experimental design. purposive sampling technique was used to select thirty (30) participants for experimental and control groups to determine the performance of male and female students taught using graphic organizers. Sixty (60) participants were also selected to determine the interest and performance of male and female students taught using graphic organizers. Descriptive statistics was used to answer research questions and a t-test to test the hypothesis at 0.05 level of significance. The result showed that there is a difference in the performance, and interest of male and female students taught using graphic organizers. Based on the findings it was recommended that there is need for government to supply graphic organizers across all Junior secondary schools in Katsina Educational Zone to increase the level of performance of students.

Keywords: graphic organizers, performance of students, basic science.

1. Introduction

Science as a discipline is considered as the systematic study of knowledge of man and his environment, which depends on seeing and testing facts. while technology is the practical use of scientific knowledge and techniques to produce goods and services to meet human needs. Through science and technology, modern gadgets in all aspects of human comfort have been invented, such as electricity, aircraft, television, computers, medical kits, and agricultural machines, among others. Similarly, through science and technology developed nations of the world such as America, China, Germany, France, and so on boast of scientific inventions and innovations, which make them to be rated as world powers. Thus, science and technology are the bedrock of sustainable economic growth and development of any nation (Samba, 2010).

Graphic organizers have proven to be powerful teaching and learning tools that can help students grasp new concepts and

save valuable time for teachers. they provide a strong visual picture for students and support their ability to learn facts, information, and new terms (McKnight, 2013). Graphic organizers, also named as visual maps, enable the use of skill areas of the brain entirely, help overcome the information load, and allow the information and resources to be collected in one place. Besides, they increase creativity providing flexibility in thinking and helping the individuals perceive the information entirely. Moreover, they clarify thoughts through relationships and organization, help individuals solve problems, make decisions, and go into action, and also develop memory and comprehension (Kansizoğlu, 2017). Graphic organizers have been classified into five major categories according to their structures: “star web, chart matrix, treemap, chain, and sketch. Graphic organizers have also been classified into eight categories according to their purposes for learning (Sam et al., 2013). This organizer can be used to help students improve their research and problem-solving skills. The development of teaching materials is a professional expertise of teachers in teaching so that they can facilitate learning under the learning objectives. Developing teaching materials requires the cognitive abilities of a teacher in analyzing curriculum, indicators, and learning objectives (Prihandoko, et al, 2018).

Mbanefo (2016) argued that the challenges of the 21st century, with its complex environmental, social, and economic pressures require young people to be creative, innovative, enterprising, and adaptable; exhibiting confidence and skills that enable them to employ critical and creative thinking purposefully. All these attributes are incorporated into the basic science and technology curriculum (Federal Ministry of Education, 2012), thus making it relevant in the 21st century in preparing students to meet global challenges. The attainment of the basic science and technology objectives will help in laying a sound foundation for future engineers, physicians, computer scientists, architects, and others, who will propel the nation to greatness among developed nations.

In a preliminary survey conducted by the researcher across

all the schools under study, the following were revealed:

1. Few teachers out of many teachers of Basic Science in the selected schools have heard of graphic organizers, in the perception of these teachers was that graphic organizers were for children in stories.
2. Few teachers who have had graphic organizers admitted that the use of organizers made their teaching very easy and their lessons more interesting. They, however, complained that more time was spent preparing and selecting concepts for the organizers.
3. Basic science students were initially apprehensive of the first set of organizers introduced to them by the teachers. They began to relax after a thorough explanation of the organizers by their teachers.

Based on this background this study seeks to examine the impact of Using Graphic organizers on the Performance of Junior Secondary School Students in Basic Science in Katsina Educational Zone.

A. Statement of the Problem

Despite the importance of Basic Science in developing critical thinking and problem-solving skills among junior secondary school students, there is a noticeable decline in their interest and performance in this subject in Katsina Educational Zone. This decline may be attributed to the traditional teaching methods that fail to engage students effectively. One potential solution to address this issue is the use of graphic organizers, which are visual tools that help students organize and understand information. In a preliminary survey conducted by the researchers, it was revealed that, in Katsina Educational Zone there is no availability of graphic organizers in the schools, and Basic Science teachers are not utilizing graphic materials. This indicated that the level of utilization is low due to lack of funds; negative attitude of basic science teachers towards the use of graphic materials in the teaching and learning process, lack of political will of government in power, and poor implementation of educational policies. However, there is a lack of research on the impact of graphic organizers specifically in the context of Basic Science and Technology in Katsina Educational Zone. Therefore, this study aims to investigate the impact of graphic organizers on the interest and performance of junior secondary school students in Basic science in Katsina Educational Zone. By examining the effectiveness of graphic

organizers in enhancing students' interest and performance, this research will provide valuable insights into the potential benefits of incorporating graphic organizers into teaching and learning Basic science.

B. Objectives of the Study

The specific objectives of this study are:

1. To compare the performance of students in Basic Science and Technology taught using graphic organizers and those without graphic organizers.
2. To determine if there is a significant difference in the performance of male and female students taught using graphic organizers.
3. To determine if there is a significant difference in the interest of male and female students taught using graphic organizers.

C. Research Questions

The questions that guided the study are:

1. To compare the performance of students in Basic Science taught using graphic organizers and those without graphic organizers.
2. To determine if there is a significant difference in the performance of male and female students taught using graphic organizers.
3. To determine if there is a significant difference in the interest of male and female students taught using graphic organizers.

D. Hypothesis

H01: There is no significant difference between the performance of students in Basic Science taught using graphic organizers and those without graphic organizers

H02: There is no significant difference in the performance of male and female students taught using graphic organizers

H03: There is no significant difference in the interest of male and female students taught using graphic organizers

2. Data Presentation

The table 1 presents the performance of students in Basic Science taught using graphic organizers and those without graphic organizers. The table showed that the mean of 29.5000 was the performance of the experimental group and the mean of 18.0167 for the control group. The result indicated that there

Table 1
Comparison of the performance of students in Basic Science taught using graphic organizers and those without graphic organizers

S.No.	Variables	Groups	N	Mean	St. D
1	Academic Performance	Experimental	60	29.2500	8.57000
2		Control	60	18.0167	5.13378

Table 2
Differences in the performance of male and female students taught using graphic organizers

S.No.	Variables	Groups	N	Mean	St. D
1	Performance of male and female students taught using graphic organizers	Male	30	28.2333	8.89278
		Female	30	30.2667	8.25847

Table 3
Significant differences in the interest of male and female students taught using graphic organizers

S.No.	Variables	Groups	N	Mean	St. D
1	Differences in the interest of male and female students taught using graphic organizers	Experimental	30	18.0167	8.57000
		Control	30	29.2500	5.13378

Table 4

H01: There is no significant difference between the performance of students in Basic Science taught using graphic organizers and those without graphic organizers

Variable	Groups	N	Mean	Std. Dev	Df.	T-cal	t-Crit	Sig (p)
Performance between male and female	Experimental		29.2500	8.57000				
	Control		18.0167	5.13378	118	8.710	1.96	0.000

Calculated $p < 0.05$, calculated $t > 1.96$ at Df 118

Table 5

H02: There is no significant difference in the performance of male and female students taught using graphic organizers

Variable	Groups	N	Mean	Std. Dev	Df.	T-cal	t-Crit	Sig (p)
Differences in the performance of male and female students	Experimental	30	30.2667	8.25847				
	Control	30	28.2333	8.89278	58	918	1.96	0.363

Calculated $p > 0.05$, calculated $t < 1.96$ at Df 58

Table 6

H03: There is no significant difference in the interest of male and female students taught using graphic organizers

Variable	Groups	N	Mean	Std. Dev	Df.	T-cal	t-Crit	Sig (p)
Differences in the interest of male and female students	Experimental	30	30.2667	8.25847				
	Control	30	28.2333	8.89278	58	918	1.96	0.363

Calculated $p > 0.05$, calculated $t < 1.96$ at Df 58

is a difference in the performance of students in Basic Science taught using graphic organizers and those without graphic organizers.

The table 2 presents the result of differences in the performance of male and female students taught using graphic organizers. The table showed that the mean of 28.2333 was the performance of males while the mean of 30.2667 was for females. This showed that there is a difference in the performance of male and female students taught using graphic organizers.

The table 3 presents the result of differences in the interest of male and female students taught using graphic organizers. The table showed that the mean of 18.0167 as the performance of males while the mean of 29.2500 is for the females. This showed that there is a difference in the performance interests of male and female students taught using graphic organizers.

3. Test of Hypotheses

Results of the t-test showed that a significant difference exists between the performance of students in Basic Science taught using graphic organizers and those without graphic organizers. This was because the calculated significance (p) value of 0.000 is lower than the 0.05 alpha level of significance while the calculated t value of 8.710 is higher is lower than the 1.96 critical t value at df. 118. This indicated that students taught using graphic organizers perform better than those taught without graphic organizers.

The T-test above showed a difference in the performance of male and female students taught using graphic organizers. The table showed that (p) value of 0.363 is higher than the 0.05 alpha level of significance while the calculated t value of 0.918 is lower than the 1.96 critical t values at df 58. Therefore, gender does significantly determine the academic performance of students taught using graphic organizers.

The t-test above showed a difference in the interest of male and female students taught using graphic organizers. The table showed that (p) value of 0.363 is higher than the 0.05 alpha level of significance while the calculated t value of 0.918 is lower than the 1.96 critical t values at df 58. Therefore, there is a significant difference in the interest of male and female

students taught using graphic organizers.

4. Discussion of Results

The findings of the study revealed that graphic organizers have proven to be powerful teaching and learning tools that can help students grasp new concepts and save valuable time for teachers, they provide a strong visual picture for students and support their ability to learn facts, information, and new terms and indicated by McKnight (2013). The findings also revealed insignificant differences between the male and female student performance as well as interest taught using graphic organizers. It was confirmed by Bukoye (2018).

5. Conclusion

The finding of the study has provided the basis for the researcher to conclude that graphic organizers help in the performance of students in learning Basic Science, with is characteristic of allowing basic science concepts to be collected in one place, it increases creativity providing flexibility in thinking and help the students perceive the information entirely. Therefore teaching basic science with graphic organizers could help in the enhancement of the memory level of the students, facilitating the teaching-learning process, improving student rate of accumulation, serving as tools used by the teachers to correct wrong impressions and illustrate things that, learners cannot forget easily, assist in giving sense of reality to the body of knowledge under discussions, It gives lessons a personal look and encourages teacher's creativity, and permit the students and teachers to experience in concrete terms the learning activities that can promote the idea of self-evaluation.

6. Recommendations

Based on the findings of the study, it was recommended that,

- i. There is a need for the government to supply graphic organizers across all Junior secondary schools in Katsina Educational Zone to increase the level of performance of students.
- ii. There is also a need for the Ministry of Education under quality assurance or education Inspectorate to

- monitor and encourage the use of graphic organizers in teaching Basic Science by every teacher.
- iii. The government should release enough money to all schools for the maintenance of graphic organizers.

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References

- [1] Brad Baxendell, (2003) Considerations Packet Graphic Organizers: Guiding Principles and Effective Practice. Available at the website at www.wm.edu/ttac accessed on 12/07/2023.
- [2] Bukoye, R. O (2018). utilization of instruction materials as tools for the effective academic performance of students: implications for counseling. 2nd Innovative and Creative Education and Teaching International Conference Badajoz, Spain, 20–22 June 2018.
- [3] FME. (2012). Nigerian Educational Research and Development Council (NERDC). Junior Secondary Education Curriculum for Basic Science and Technology. Lagos: NERDC Press. pp. 1-3.
- [4] FRN. (2014). National Policy on Education. Nigeria: FGN Press.
- [5] Kansizoglu., Basri, & Hasan. (2017). The Effect of Graphic Organizers on Language Teaching and Learning Areas: A Meta-Analysis Study. *Journal Education and Science*, 42(91), 139-164.
- [6] Mankilik, M. (2014). Innovation in Science Technology and Mathematics. 2(1). Plateau State: *Science Teachers Association of Nigeria*. 50(10), 1-8
- [7] Mbenefo, M.C. (2015). Developing Creative Thinking Skills in Basic Science. *Teachers Association of Nigeria*, 50(10), 207-216.
- [8] McKnight, K.S. (2013). *The Elementary Teacher's Big Book of Graphic Organizers*. United States of America: Jossey Bass.
- [9] Onukaogu C. E. (1994). Teacher effectiveness in the use of English curriculum at the Obafemi Awolowo University, Ile-Ife. An unpublished doctoral thesis submitted to the Department of English, University of Ibadan, Ibadan, Oyo State, Nigeria.
- [10] Owolabi1, J. & Adaramati, T.F (2015). Effects of Graphic Organiser on Students' Achievement in Algebraic Word Problems. *Journal of Education and Practice*.6(5), 39-45.
- [11] Parrot, M.A.S & Leong, K.E. (2018), Impact of Using Graphing Calculator in Problem Solving. *International Electronic Journal of Mathematics Education* 13(3), 139-148.
- [12] Prihandoko, Y., Slamet, St.Y., & Winarno. (2018). Cognitive Moral Based on Civics Education Material in Elementary School. *Journal of Education and Learning (EduLearn)*, 12(3), 472-477.
- [13] Sam D, P., & Rajan, P. (2013). Using Graphic Organizers to Improve Reading Comprehension Skills for the Middle School ESL Students. *English Language Teaching*, 6(2), 155-170.
- [14] Samba, R.M.O., Achor, E.E., & Ogbaba, J.A. (2010). Teachers awareness and utilization of innovative teaching strategies in secondary school science in Benue State Nigeria. *Educational Research*, 1(2), 32-38.