

VIDEO-BASED THINK-PAIR-SHARE INSTRUCTIONAL STRATEGY AND SECONDARY SCHOOL CHEMISTRY STUDENTS' PERFORMANCE ON PERIODIC TABLE IN RIVERS STATE

A. A. AROKOYU, PhD.

Department of Curriculum Studies and Educational Technology
Faculty of Education, University of Port Harcourt
Rivers State

And

NWAFOR CHIMUANYA LEONARD

Department of Curriculum Studies and Educational Technology
Faculty of Education, University of Port Harcourt
Rivers State

Abstract

The study investigated video-based think-pair-share instructional strategy on secondary Chemistry school students' performance on periodic table in PHALGA. Influence of gender on Chemistry students' performance was considered. Two objectives, two research questions cum hypotheses were tested. Quasi-experimental was employed in this study. One hundred and three (103) Chemistry students from two mixed secondary schools randomly selected participated in the study. Video-based instructional package on periodic table as a concept in Chemistry was used as the treatment while Periodic Table Performance Test (PTPT) was utilized to gather data. Mean and Standard deviation helped in answering the research question. ANCOVA tested the hypotheses. The findings of the study revealed that significant difference existed between the academic performance of students in experimental and control groups. In addition, gender had no influence on Chemistry students' performance in think-pair-share group. It was recommended that Chemistry Teachers at the secondary school level should expose Chemistry students to video-based think-pair-share instructional strategy in this 21st century to encourage digital literacy and team work in the classroom towards improving academic performance in Chemistry.

Keywords: Video-based Think-Pair-Share, Instructional Strategy, Periodic Table, Digital Tools.

Introduction

A functional education involves acquiring knowledge and applying it to solving a problem. The importance of Chemistry in science is well recognized. Chemistry is a vital subject for science students in Nigeria. Its role as foundation for science education, nation building and agent for development has been reported by many scholars (Fred, 2014, Aina, 2016 & Halio, 2016). The central role of Chemistry especially in scientific and technological development evidenced on its impact on Engineering, Medicine, Pharmacy, Architecture and other Science disciplines necessitated the importance of providing students with sound background in Chemistry (FRN, 2014). Students at this level must not only acquire empirical but practical understanding of Chemistry. With the increasing emergence of new technology and innovative teaching strategies, new challenges are also generated for Chemistry teachers in order to meet with the demands of science teaching at present

We live in the computer age where technological tools have preeminence over human actions, functions and relevance. Education also, has been greatly enhanced by these technological tools. Learning in the 21st century has changed from traditional method to digital technique (Kelvin, 2016). Learning requires active process which includes students' participation, engagement and involvement. Teaching-learning environment has changed from teacher-centered to learner-centered using digital tools to enhance effective learning. One of such tools is video-based learning. Teachers presently are facilitators of knowledge; therefore the potential of representing abstract concepts visually provides Chemistry teachers with modern techniques and capabilities. Video-based learning guarantees powerful potential for science and technological education. Millions of learners watch videos from different platforms (eg, YouTube, WhatsApp, Google, T.V) on a diverse number of terminals (desktop, phone, tablet). Students access academic contents through on-line courses from any location apart from the classroom. In recent years, various video-based learning tools have been developed and empirical studies have been conducted. According to Adebayo (2008), video-based instruction with various illustrations can be used to present content in ways that are not possible within the confines of the traditional lecture method. Therefore, this study used video to support think-pair-share instructional strategy in the experimental group while video instructional package was not used in the control group where lecture method was used.

Think-pair-share is a group learning that encourages positive interaction among members of a group in terms of thinking and sharing of possible answers to a question posed by a teacher, agreeing on the best answer before voicing such answer to the class. Think-pair-share is a cooperative instructional strategy in which students are in small groups so that they can work together to maximize each other's shared knowledge. Cooperative learning changes students' and teachers' roles in the classroom. Don (2016) asserted clearly that students showed improvement in academic interactions, feelings, interest and learning styles as a result of cooperative learning strategy. Gandi (2015) observed that students' performance increases when they are engaged in interactive strategies. Apart from enhancing collaboration, Think-pair-share strategy helps students to engage in critical thinking forum to negotiate different perspectives in order to increase self-reliance and individualistic confidence.

Ikeme and Williams (2016) opined that sex has no significant effect on students' academic performance when taught using confidence building strategy like Think-pair-share instructional strategy. Jacobs (2016) in a study also found out that being a male or female does not influence students' academic performance considering the method of lesson delivery. It is interesting to say that gender equality and interaction can be best achieved during video-based instructional strategy.

The integration of technological tools into the 21st century classroom prepares both teachers and students for the challenges and opportunities that are available in the societies. Students' motivation and information retention as well as their ability to do research work in a team also increases. The use of technological tools for teaching allows personal learning via seeking out the subject matter they like. Students use information online, or in a traditional classroom with their teachers and colleagues in order to learn new lessons. There is therefore a wide gap to be filled using technology such as video-based instructional package to support instructional strategies. The use of video-based instructional package in a think-pair-share cooperative learning is an innovation. Sequel to this, the study focused on the effect of video-

based think-pair-share instructional strategy on senior secondary school students' performance on the periodic table in PHALGA, Rivers State

Statement of the problem

The nature of instruction in the traditional classroom is the one that the teacher stands in front of students to dictate from textbooks. Empirical observation shows that students remain passive in this type of learning situation throughout the lesson. The output of this type of classroom teaching is poor performance in examinations. This has been a worrisome situation to Science educators, Parents and other stakeholder in Science.

Despite of the relevance of Chemistry especially in the field of medicine among other science subjects and related disciplines, literature replete that students' performance in Chemistry has been relatively poor WAEC Chief Examiner's report (2018). This has raised doubts among educators about the efficacy of teaching methods and approaches adopted over the years. Students' academic performance in Chemistry depends on many factors of which how well the subject is being taught stands out. The 21st century students are digital oriented; hence the traditional method of teaching is no longer adequate for problem solving. Base on this, the study focused on the effect of video-based think-pair-share instructional strategy on senior secondary school students' performance on periodic table in PHALGA, Rivers State

Aim and Objectives of the Study

The study focused on the effect of video-based think-pair-share instructional strategy on senior secondary school students' performance on periodic table in PHALGA, Rivers State. Specifically, the objectives of the study were to:

1. Assess the academic performance of students when taught periodic table using video-based think-pair-share instructional strategy
2. Compare the academic performance of male and female students when taught periodic table using video-based think-pair-share instructional strategy

Research Questions

1. What is the academic performance of students taught periodic table using video-based think-pair-share instructional strategy and Lecture Method?
2. How does the academic performance of male and female students taught periodic table using video-based think-pair-share instructional strategy and Lecture Method differ?

Hypotheses

Ho₁: There is no significant difference between the academic performance of students taught periodic table using video-based think-pair-share instructional strategy and those taught using Lecture Method

Ho₂: There is no significant difference between the academic performance of male and female students taught periodic table using video-based think-pair-share instructional strategy and Lecture Method

Methodology

The study employed a quasi-experimental design involving pretest and posttest non-equivalent group. Two mixed schools were used. Sample size was purposively selected to get 2 two schools with 103 SS2 Chemistry students. The researchers used Chemistry students (SS2) because they would sit for the School Certificate Examination (SSCE) in 2021.

Instrument used for data gathering contained 20 objective questions covering important aspect of the content taught which was validated by two experts. An index of 0.76 was arrived at on reliability test. The experimental group was exposed to video-based think-pair-share instructional strategy. A posttest was given to both groups of students in order to determine the effectiveness of the treatment. Mean and standard deviation answered the research questions while ANCOVA was used to test the hypotheses at 0.05 significance level.

Results

Research Question 1: What is the academic performance of students taught periodic table using video-based think-pair-share instructional strategy and Lecture Method?

Table 1: Mean and Standard deviation of pre-test and post-test performance of students in Periodic Table using video-based think-pair-share instructional strategy

Group	n	Pretest	SD	Posttest	SD	Mean Difference
VBTPS	52	69.80	3.57	75.50	7.20	5.7
LM	51	64.60	4.52	67.80	5.60	3.2

Table 1 showed the pretest and posttest means of experimental group are 69.80 and 75.50, while for control group pretest and posttest means are 64.60 and 67.80. This result indicated that experimental group had a greater mean performance in the subject matter taught.

Research Question 2: What is the academic performance of male and female students taught periodic table using video-based think-pair-share instructional strategy

Table 2: Mean and Standard deviation of pre-test and post-test performance of male and female students in periodic table video-based think-pair-share instructional strategy

VBTPS	n	pre-test mean	SD	Post-test Mean	SD	M/G
Male	32	65.15	2.65	71.10	7.24	5.9
Female	20	71.30	4.29	75.20	7.26	3.9

MG= Mean Gain

Table 2 showed the pretest and posttest means of male to be 65.15 and 71.10, while for female pretest and posttest means are 71.30 and 75.20. This result indicated that males had a greater mean gain of 5.9 while females in the subject matter taught. This showed that male students performed better than the female students in this study.

Ho₁: There is no significant difference between the academic performance of students taught period table using video-based think-pair-share instructional strategy and Lecture Method

Table 3: Analysis of Covariance (ANCOVA) on Performance of SS 2 students taught periodic table using video-based think-pair-share instructional strategy

Source	Type III	Df	Mean	F	Sig.
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	Sum of Squares		Square		
Corrected Model	1145.148 ^a	2	572.574	13.726	.000
Intercept	1966.662	1	1966.662	47.147	.000
Prep	80.009	1	80.009	1.918	.169
Group	974.532	1	974.532	23.362	.000
Error	4296.513	100	41.714		
Total	40002.000	103			
Corrected Total	5441.660	102			

Table 3, it can be seen that the F-value of 23.362 obtained at 1 and 100 degrees of freedom had a corresponding p-value of 0.000, which is lesser than the chosen alpha of 0.05 ($.000 < 0.05$) for the study. This means there is significant difference between the academic performance of students taught using video-based think-pair-share instructional strategy and Lecture Method.

Ho₂: There is no significant difference between the academic performance of male and female students taught periodic table using video-based think-pair-share instructional strategy and Lecture Method

Table 4 Analysis of Covariance (ANCOVA) on Performance of male and female SS 2 students taught periodic table using video-based think-pair-share instructional strategy

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	99.649 ^a	4	24.912	.518	.723
Intercept	2493.335	1	2493.335	51.861	.000
PretestP	38.718	1	38.718	.805	.372
Group	22.323	1	22.323	.464	.497
Gender	4.685	1	4.685	.097	.756
Group * Gender	39.220	1	39.220	.816	.368
Error	5144.270	49	48.077		
Total	57145.000	52			
Corrected Total	5243.920	50			

Table 4 showed that there was no significant difference between the performance of male and female students taught periodic table using video-based think-pair-share instructional strategy ($P=.368 > 0.05$).

Discussion of Finding

Result in table 1 indicated that experimental group had a greater mean performance in the subject matter taught. In table 3, there was significant difference between the academic performance of students taught using video-based think-pair-share instructional strategy and Lecture Method. This result is in agreement with the findings of Don (2016) who concluded that students showed improvement in their academic interactions, feelings, interest and learning styles as a result of cooperative learning strategy. In another study, Gandi (2015) observed that students' performance increases when they are engaged in interactive strategies. The study of Johnson, Roger and Karl (1991) also demonstrated that cooperative learning produces higher achievement, more positive relationships among students. Gambari and Zubairu (2008) found that cooperative learning facilitate greater improvement on students' performance in English, Mathematics and Science subjects than does competitive or individualistic learning environment. In Table 2, male students performed better than the female students. However, table 4 showed no significant difference between the performance of male and female students. This finding supported the earlier finding of Ikeme and Williams (2016) who found out that gender has no significant effect on students' academic progress when taught with any interactive strategy. Jacobs (2016) also found that being a male or female does not influence students' performance regardless of any teaching method. However, the present finding contradicts the earlier findings of Ezeugwu (2007) who observed that gender has significant effect on students' performance with any interactive teaching strategy.

Conclusion

Based on the findings of the study, it was concluded that the use of video in a think-pair-share instructional strategy in teaching has significant effect on the students' academic performance. This provided empirical evidence on the relative efficacy of the use of technological tools in the classroom in enhancing the teaching and learning outcomes in Chemistry. Furthermore, the use of the instructional package in a think-pair-share cooperative learning environment is an innovation. This is so because the integration was found effective in improving students' performance.

Recommendations

The study recommended that:

1. Teachers at the secondary school level should expose Chemistry students to video-based think-pair-share instructional strategy in this 21st century to encourage digital literacy and team work towards improving academic performance in Chemistry.
2. Teacher education program should be improved especially on the use of technology to enhance academic performance of students

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