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Effects Of Enhanced Think-Pair-Share On Senior Secondary School Students' Learning Outcomes In Physics

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Abstract: ***The study examined the effects of enhanced Think-Pair-Share on Senior Secondary School students' learning outcomes in Physics in Ondo State, South West, Nigeria. The study adopted a pre-test, post-test control quasi-experimental design. The sample for the study was 80 Senior Secondary School class two students randomly selected from two Senior Secondary Schools in the state. The two secondary schools were randomly selected from Akure, the capital city of the state. The instruments used for the study were a 20 item Questionnaire on Attitude of Students towards the studying Physics (QASP) and Physics Performance Test (PPT). The PPT comprised 20 multiple choice items. Validity of the instruments was ensured and the reliability was determined using Kuder-Rechardson 21 (Kr_{21}). The data collected using the two instruments were analysed using descriptive and Inferential Statistics. The outcome of the analysis revealed that the attitude of students improved towards the studying of Physics and their performance enhanced when exposed to the use of enhanced Think-Pair Share teaching strategy. Based on the findings, it was recommended that the enhanced Think-Pair-Share should be used in teaching Physics in Senior Secondary Schools in Nigeria.***

Keywords: ***Enhanced-Think-Pair-Share, Senior Secondary School, Learning Outcomes, Physics, Attitude, Performance.***

I. INTRODUCTION

Learning outcomes are products of many factors, part of which includes: teacher factors, learning environments, learning materials, and teaching strategies. Classroom interaction is the putting together of all factors mentioned and teaching strategy is one of the major determinants of effective classroom activities. For better learning outcomes, learners must be provided with every facility that could enhance their mastery of the concepts (Hamdu and Agustina, 2011; Sharif, 2012). According to Hetika and Yeni (2017), a good teaching method can improve the learning achievement of students.

Think-Pair-Share learning strategy is said to be one of the most effective strategies in the classroom (Ni'mali, 2014; Surayya, 2014; Ahmed, 2016, and Hetika &Yeni, 2017). TPS is part of cooperative learning objectives where students team together to carry out an assignment. Cooperative learning is one of the active learning strategies involving two or more students working together as a team (Salman 2015, Zaiteran, 2016). There are three important elements in the TPS leading to three main steps in the implementation. Each element dictates the classroom activities expected of both the teacher and his students. TPS when used in science encourages the activity-based nature of the subject. It is a student-centered-approach, where all students are active members of the class. It embraces "hands-on" strategy and has the potential of increasing students' self-efficacy. The three important elements and the activities included are:

THINK: This is the first stage in the strategy. Here, the students thereafter are left alone to think on the possible solutions to the problems, document their thoughts and findings (Lightner & Tomaswick, 2017; Hetika and Yeni, 2017)

PAIR: The next stage is to pair the students for further interactions. At this stage, each student in the pair presents and explains their findings and collaborates with his pair. The two in the pair agree together and have a common resolution as a

unified finding to the activities given (Lightner & Tomaswick, 2017)

SHARE: At this third stage, each pair shares their findings with the entire class in turns. At this stage the teacher facilitates and coordinates the class but not to place judgments yet.

COMPARE: This is an additional stage to the TPS of Frank Lyman and Arlene Mindus developed in 1977 and that of Kegan in 1991. In TPS, an activity ends after sharing to the entire class and the class returns to their pairs. The teacher directly placed judgments on the findings presented by the pairs but in TPSC, the findings are thrown back to all the pairs in the class for constructive criticism. This is done in collaboration among pairs. After the presentation by a pair, other pairs in the class collaborate and criticize the presentation to make it robust and enriching. By this, each pair will have the initial judgments from their colleagues. This will make each student an active member of the class as each of them is heard judged in turns. The teacher thereafter summarizes the findings and presents a final consensus. TPSC is an improved version of TPS.

II. STATEMENT OF THE PROBLEM

Learning outcomes are products of teaching and learning process which is characterized by the environment, materials and methods. If appropriate and effective method is employed in teaching a concept, there is likelihood that the learning activities will be better. Most classrooms have been witnessing teacher centered and passive students' moments. Innovations are not seen in the teachers' presentations over the years. Learning outcomes therefore are not showing any improvement. Regurgitations are rampant among students are a result of lack of understanding of the learning process and concepts. Active learning has not been the priority of the teachers. There is need for active learning in classrooms. This calls for innovations in the methods of teaching. On this basis, the study was carried out to investigate the effects of enhanced Think-Pair-Share on Students Learning outcomes on Senior Secondary School students in Physics.

III. RESEARCH QUESTIONS

The following questions were raised to guide the study

Q1. What is the attitude of students towards Physics before and after the treatment?

Q2. There is no difference between the pretest and posttest mean scores of experimental and control groups.

RESEARCH HYPOTHESES

The following research hypothesis were formulated and analyzed in this study

Ho1. There is no significant difference in the attitude of experimental group before and after treatment.

Ho2. There is no significant difference between the posttest mean scores of experimental and control groups

IV. METHODOLOGY

The design used for the study was a pretest-posttest control quasi-experimental research. The sample used was 80 Senior Secondary School class two students selected from two schools in Ondo state, South-West, Nigeria. Simple random sampling technique was used in the selection of the two schools, the classes and the students used. School A comprised of 20 students and was chosen as the experimental group while school B was the control group with of 20 students. The instruments used for the study were, a 20 item Questionnaire on Attitude of Students towards the studying Physics (QASP) and Physics Performance Test (PPT). The PPT comprised 20 multiple choice items. Each item in QASP was rated 1 mark giving a maximum of 20 marks while correct response to each item in PPT was scored 2 marks giving a maximum of 40 marks. The two instruments were subjected to face and content validity. Test-retest method was carried out by administering the two instruments on 10 students outside the sample to determine the reliability coefficients of the instruments. Data collected were analyzed using Person's Product Moment Correlation. Reliability coefficients of 0.87 and 0.81 were obtained for QASP and PPT respectively at 0.05 level of significance.

Experimental and Control were given the QASP and administered the PPT to determine their scores before the treatment. Experimental group was thereafter exposed to treatment for 10 weeks using enhanced TPS. Their regular teachers were trained in the use of TPS and they were used as research assistants. The control group was left to their normal class teacher's teaching methods.

In the *first stage*, the teacher presented the learning activities and the stated objectives to the students. The students were thereafter left to think about the learning activities and determine the procedure to be taken to achieve the stated objectives. Each student documents their findings.

In *stage two*, the teacher asked the students to determine their pair. The whole class was arranged in pairs. Each pair thereafter present their findings to their partner and both discussed and reach a consensus on the learning objectives.

In *stage three*, the class came together and each pair share their findings while other pairs paid attention and later commented on the presentation and corroborate the findings of the presenter where necessary.

In *stage four*, the students collaboratively compared and harmonized the submissions of all pairs. The summary of all findings was finally presented to the teacher and the entire class for teacher's confirmation. In some situations where the learning objectives were not achieved, the class were returned to their pairs revisit the activities. Where the learning objectives were achieved, they proceeded to the next activities.

V. RESULTS

A. DESCRIPTIVE ANALYSIS

Question1: What is the attitude of students towards Physics before and after the treatment?

Item	Yes	
	N	%
I like to study Physics	26	32.5
I spend some time in the school library every school day	21	26.3
I have personal textbooks on Physics	16	20.0
Class assignment is always difficult to do	74	92.5
I have personal and private study time for Physics at home	18	22.5
I do solve some Physics problems on my own	15	18.8
I feel happy when it is time for Physics lessons	10	12.5
I enjoy studying Physics than doing any other activity	10	12.5
I always like to participate in Physics class activities	11	13.8
I don't like sitting for class tests in Physics	76	95.0
I like my Physics teacher	16	20.0
I always spend my free time in the Physics laboratory	12	15.0
I like to carry out experiments in Physics	11	13.8
I am very conversant with the Physics apparatuses	22	27.5
I enjoy asking questions on Physics	9	11.3
I like discussing with co Physics students	9	11.3
I chose Physics as a subject by my self	32	40.0
I don't like missing Physics class	14	17.5
I enjoy attending extra class in Physics	10	12.5
I always spend some time with the laboratory attendants during lunch break	12	15.0
I don't always come late to Physics class	56	70.0

Table 1: Percentage analysis of the attitude of students towards Physics before the treatment

Table 1 revealed that 32.5% of the students sampled like to study Physics, 26.3% were using the school library, 20.0% have Physics text books, 92.5% always find class assignments too difficult to solve, while 22.5% claimed to have personal time table for home study. It was revealed further that only 18.8% do attempt Physics problem solving on their own, 12.5% do feel happy attending Physics lessons, 12.5% enjoys Physics than other subjects, 13.8% like to participate in class activities, 95.0% don't like class test, only 20.0% like their Physics teacher and 15.0% of the sample do spent their free time in Physics laboratory. The table showed further that only 13.8% use to carry out experiments in Physics, 27.5% are very conversant with the apparatuses in the laboratory, 11.3% use to ask questions on Physics concepts, 11.3% also use to discuss Physics with other students while 40.0% chose Physics as a subject in their own volition. Only 17.5% of the students don't like missing Physics class, 12. 5% enjoy attending extra class in Physics, 15.0% use to spend time with the laboratory attendants and 70.0% don't always like getting to class late.

Question 2: There is no difference between the pretest and posttest mean scores of experimental and control groups.

Scores	Group	N	Mean	SD	Mean diff.
Pretest	Experimental	40	18.62	3.08	0.19
	Control	40	18.43	3.11	
Posttest	Experimental	40	31.90	3.83	11.47
	Control	40	20.43	2.52	

Table 2: Analysis of the pretest and posttest mean scores of experimental and control groups.

From table 2, the mean difference in the pretest mean scores of experimental and control groups was 0.19. This implies that there was no substantial difference in the pretest mean scores of the experimental and control. The two groups performed equally before the commencement of the treatment. The table further revealed that the mean difference in the posttest mean scores of the two groups was 11.47. This implies that there was a substantial difference in the posttest mean scores of the two groups. Experimental group performed better than the control group.

B. HYPOTHESES TESTING

Ho1: There is no significant difference in the attitude of the experimental group before and after the treatment.

Attitude	N	Mean	SD	df	T	sig
Before	40	9.50	2.18	39	16.17	0.000*
After	40	16.75	2.12			

**p> 0.05*

Table 3: t-test analysis of the difference between the attitude of the experimental group before and after the treatment

Table 3 showed that the p value (0.000) was less than the α (0.05) value. Therefore, the hypothesis was rejected. There was a significant difference in the attitude of experimental group towards Physics before and after the treatment. Their attitude towards their course of study improved after the treatment.

Ho2: There is no significant difference between the posttest mean scores of experimental and control groups.

Group	N	Mean	SD	df	t	sig
Experimental	40	31.90	3.83	78	15.83	0.000*
control	40	20.43	2.52			

**p> 0.054*

Table 4: t-test analysis of the difference between the posttest mean scores of experimental and control groups

Table 6 revealed that the p value (0.000) was less than the α (0.05) value. Therefore, the hypothesis was rejected. There was a significant difference in the posttest mean scores of experimental and control. Experimental group performed better than the control group.

VI. DISCUSSION

The findings of the study showed that revealed that the students' attitude towards Physics before the treatment was not encouraging. only few of the students sampled like to study Physics and a good number of them were not having have Physics text books and not interested in using the school library at the same time. Majority of them always find class assignments too difficult to solve and never interested in solving Physics problems on their own. The findings showed

that the student doesn't like Physics lessons, and by this, they don't like to participate in class activities. In all ramifications, the students had negative attitude towards the study of Physics. But the students' attitude improved after the treatment. This implies that the use of Think-Pair-Share improved the attitude of the students towards Physics drastically. This finding was in agreement with Fitzgerald, (2013), Lightner and Tomaswick, (2017) and Raba, (2017) who all agreed that the use of Think-Pair-Share increased students' engagement in their studies.

The findings of the study also revealed that there was a significant difference in the posttest mean scores of experimental and control. Experimental group performed better than the control group. This was a prove that the use of Think-Pair-Share-Compare has the potentials to enhance students' academic performance in Physics. This was in agreement with the works of Sharif, (2012), Ni'mah, (2014), Surayya, (2014), Salman, (2015) and Ribhi, (2017) who all agreed that use of Think-Pair-Share can improve the academic performance of students. This could be as a result of the students being active members of the class where each of them attended to the class activities and arrived at certain findings that resulted into the achievement of the learning objectives

VII. CONCLUSION AND RECOMMENDATION

The study was able to present Think-Pair-Share-Compare as an active and effective learning strategy for secondary schools. It was concluded from the study that the use of Think-Pair-Share-Compare (TPSC) has the potentials to enhance students' attitude towards their study and as well improve their academic performance. The use of the TPSC gives the students an opportunity of active participation in the class work. It enhances the self-efficacy of the students.

Based on the findings, it was recommended that TPSC be used to teach students in secondary schools in order to enhance their attitude towards their studies and also to improve their performance.

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