International Journal of Quantitative and Qualitative Research Methods
Vol.10, No.3, pp.17-26, 2022
Print ISSN 2056-3620(Print)
Online ISSN 2056-3639(Online)

Enhancing Results-Oriented Mathematics Classroom Interaction: The Pause-Procedure Strategy Feedback

Akinwamide, Comfort Oluwasesan (Ph.D)
Department of Science Education Department,
Bamidele Olumilua University of Education, Science and Technology, Ikere, Ekiti State, Nigeria

Olofin, Samuel Oluwaseyi (Ph.D)
Department of Science Education, Faculty of Education, Ekiti State University, Nigeria

Citation: Akinwamide, Comfort Oluwasesan and Olofin, Samuel Oluwaseyi (2022) Enhancing Results-Oriented Mathematics Classroom Interaction: The Pause-Procedure Strategy Feedback, *International Journal of Quantitative and Qualitative Research Methods*, Vol.9, No.3, pp.17-26

ABSTRACT: *This empirical study establishes the use of pause procedure in the teaching and learning of Mathematics. Quasi-experimental of pre-test posttest control group design was adopted to establish the effect of independent variable over the dependent variable. 208 primary school pupils were selected as the sample for the study. Three hypotheses were generated. The experimental and control groups were homogenous at the beginning of the study as discovered from the analysis of the pretest data collected. After the treatment, the students were examined to determine the effectiveness of treatment. Mathematics Performance Test (MPT) was the instrument employed by the researcher to collect data for the study. Data collected were analysed using t-test analytical tool. It was observed that the use of pause teaching procedure helped pupils to perform better in Mathematics. Findings showed that pause procedure had positive effects on the learners' performance in Mathematics. It was observed that gender has no effect on pause procedure as a teaching strategy in primary schools. Hence it was recommended that Mathematics teachers should adopt the use of pause teaching procedure for better performance in Mathematics.*

KEYWORDS: pause method, pauses, chunk, mathematics teaching, learners' performance,

INTRODUCTION

One of the aims and objectives of education is the acquisition of knowledge that will help in developing a child to become a useful individual in the society. To achieve this, Mathematics is one of the tools considering it's functionalities in the individual development and societal upliftment. Formal teaching and learning of Mathematics starts from elementary or basics schools, even from creche where toddlers are familiarized with mathematical toils (Akinwamide, 2022).

Several researches on the teaching and learning of Mathematics have been carried out in secondary schools, but it seems lower/basic classes are not always being considered and the content of the curriculum specifies rationale for teaching Mathematics in primary schools which includes to develop in pupils positive attitude towards the subject through which the learners become responsible citizens to themselves, the community and the nation at large. As the saying that morning determines the day, if a pupil in elementary class is developing Mathematics phobia, one can predict what future will earn such child in the subject. The curriculum planners emphasizing pupils' proficiency in computational skills and problem-solving forms and shapes identification, regard Mathematics as a core subject. Because Mathematics seems to be abstract in nature, students in basic schools easily lose interest in it especially low-achievers (Yeh, Cheng, Chen, Liao & Chan, 2019).

Students' confidence in the learning of Mathematics should be encouraged by researching into better ways to improve their performances in examinations since it has been observed by researchers that students performance in Mathematics have always been tangential to expectations (Kolawole 2013 and Popoola 2013). Also, educators have established the fact that teaching strategies could contribute to better performance. Many educators have launched out to finding the effects of different strategies on learners performance (Anthony & Walshaw, 2009; Akinwamide & Popoola, 2015; Su; Ricci & Mnatsakanian, 2016; Veesar & Khaskheli 2019). Some teaching strategies are tagged "active strategies", these include; Collaborative, Think-Pair-Share, Jigsaw, Pause and Problem-based-Learning. Pause procedure has been researched into, by several researchers in secondary schools and tertiary institutions (Bacheal & Thaman, 2014; .Abiam & Odok 2021). Observations showed that not much work have been done on how to teach Mathematics using pause techniques among primary schools pupils, also to consider its possibility and effectiveness. This was the reason for the consideration of pause procedure in the teaching and learning of Mathematics among some group of primary four pupils in Ikere Local Government Area of Ekiti State, Nigeria.

Pause technique has being in use over decades (Rowe 1976; Ruhl, Hughes, & Schlooss 1987). Pause procedure is a technique in which the teacher uses strategic pauses to provide students with the time during which they can review their notes, discuss among their peers or undertake any similar activities that allows them to clarify, assimilate and retain the material Damian Gordon (2014). Pause strategy has been described in different ways, for instance, Ruhl et al 1987 and Bacheal & Thaman 2014, described this teaching strategy as "active strategy" that requires little class time. This description is tailored towards pause and time, that within little time, learners will achieve much. Pausing in-between the lecture should be planned ahead to ensure that learning occurs within the classroom. This will be indicated in the lesson plan and lesson note by the instructor. According to Andrews & Pitt, 2016, "Pause" is a strategy of teaching in which the

instructor gives space or time within the lesson for learners to read and digest what the learners had just been taught. The procedure reduces inferiority feelings as learners are given the opportunity of talking in the Mathematics lesson which builds confidence in them individually, widened their mathematical vocabulary and deepens their understanding of the subject matter. This period is referred to as 'wait time' (Andrews, Ingram & Pitt, 2016). Pause procedure is not only effective in secondary schools, it is also very effective in high institutions. This was evident in the research carried out by Bachhel and Thaman (2014) when a set of students in neuromuscular physiology class was taught using pause strategy and the result showed that this strategy had positive effect on the performance of the students when compared with another set of students that were taught conventionally. This technique helps learners to be more attentive, collaborative and retain facts that can be transferred to solve greater or more difficult questions. The privilege of collaborating with other learners extends love and acceptability among learners.

The teacher strategically prepare the lesson to allow pausing. It is always advisable that pause comes after each step during the period of teaching. This enables the consideration for every new thing that was discussed. Rowe (1983) suggested the use of at least three five minutes pauses in the lecture at 8-12 minute intervals to enhance learning. But for a lesson that lasts for 40 minutes, the pause time of 3-4 minutes for three times could be appropriate, though extension of time could be permitted especially when students demand for such. Pause technique can be used in all academic levels. This procedure gives room for the knowledge gained or passed across to sink and register in the minds of the learners. Pausing time acquires the learner the opportunity to learn personally as he is able to review the work done, ask questions from his peers and the instructor as the work is done bit by bit. During teaching, the learner's concentration might diminished for any reason, a short break can help to re-orientate attention. Pause technique is regarded as the promoter of students' engagement as learners busy perusing, analyzing, and synthesizing the content of the instruction given by the instructor (Bachhel & Thaman, 2014).

Significantly, pause strategy assists the student to discover how much he had been able to retain from the subject matter and where to seek help of another learner before the teacher resumes the teaching. Mathematical language skills include the abilities to read with comprehension, to express Mathematical thoughts clearly, to reason logically, to recognize and employ common patterns of Mathematical thought (Akinwamide, 2021). These are encouraged in pausing within a lesson as it gives room for learning, comprehension and analysis of learning material. Also, the learner is given the opportunity during pause to ask questions before the teacher moves forward. Learners are also free to go to one another to ask questions about areas of gaps. In a Mathematics class, it is possible for a child to have dropped from following the instructor as a result of inability to get how a

particular step was arrived at. During pauses time, such learner has the opportunity of liaising with friends and get back to the track before the teacher progresses.

Linsin (2012) observed five reasons for the use of pauses as; positive expectations, excitement, break disruption, adjustment and information recall. This waiting time accorded learners the grace to ask questions from the teacher while the teacher can as well ask learners questions to ascertain the effectiveness of the teaching. This provides the quick feedback that enables the instructor to feel gaps in the previous step before proceeding to new idea. The awareness of pause procedure and when to switch to pauses, where to switch and why of the pause should be made known to the learners so that the wait time or talk time would not be turned to leisure time for irrelevances.

Ingram and Elliott (2016) spelt out the role of pauses in classroom interaction as initiating response and letting in feedback. Pause technique can encourage low-achieving students as they peruse work done before the instructor proceeds to the next level. Imperatively, a worth procedure of these descriptions for better performance in Mathematics especially in the basic schools should be considered. The quest for better performance in Mathematics is always current as the results of pupils in basic schools and even the students in higher classes of secondary schools have not being encouraging. This fact is not far-fetched, the statistical data of the WACE and NECO results show this yearly. Placement evaluation results of primary schools are not left out of this unsatisfying performance in Mathematics. There is the need for better performance so that this ever invaluable subject will continue to be in its position as the backbone of any nation. Since the world is made up of male and female and there could be some situations that can favour a particular sex than the other, it could be appropriate to consider whether gender will have effect on pause technique.

Hypotheses

1. There is no significant difference in the performance scores of students exposed to Pause-teaching procedure and those in the control group before treatment.
2. There is no significant difference in the performance scores of students exposed to Pause-teaching strategy and those in the control group after treatment.
3. There is no significant difference in the performance of male and female students under the use of pause procedure.

RESEARCH METHOD

This study adopted quasi-experimental of pre-test, post-test, control group design. This design was employed to examine the effects of pauses technique as an independent variable on students' performance as dependent variable. Consideration was given to performance comparability in

terms of gender to establish any effect that gender may have on the adoption of Pause teaching technique. Pre-test conducted was for the establishment of the homogeneity of the students' performance before treatment. Post-tests conducted after the treatment were used to measure improvement on performance in the two groups. Pause procedure was used to teach Mathematics in the experimental group while the control group was exposed to conventional strategy of teaching.

Hence, the diagrammatical represented of the design:

(Experimental Group) O_1 X O_2

(Control Group) O_3 C O_4

X- Pauses teaching procedure

C- Conventional strategy.

The sample for the study consisted of 208 primary school pupils selected purposively from the public primary schools in Ikere Local Government Area of Ekiti State, Nigeria. Pretest was administered to the two groups as formative test to establish their level of performance before the treatment and also to confirm their homogeneity. The class teachers of the selected students acted as research assistants for experimental group, they taught their pupils using the lesson notes prepared with pause consideration. After the first step that contains introduction of the topic, pupils were allowed a pause of 3-4 min. Peer discussion was done by the pupils where they asked questions among themselves and supplied answers to the questions. Gaps were discovered which led to the pupils asking questions from the teachers and the teachers also asked questions from the pupils. All questions were solved as the instructors led the pupils through. After step II which contained the body of the work, the pausing time of 3 to 4 min was also allowed for questioning and reviewing, as the interaction was pupil to pupil, pupil to teacher and teacher to pupil order of questioning. The third step combined conclusion and summary. Pupils were also allowed 3 to 4 min for pausing time. The control group was taught conventionally. A self developed instrument named Mathematics Performance Test (MPT) was used to collect data for the study. Post test was administered, data were collected and analysed using t-test.

RESULTS

Hypothesis 1: There is no significant difference in the performance scores of students exposed to pause teaching procedure and those in the control group before treatment.

Table 1: The t-test Analysis of pre-test Scores of Experimental and Control Groups on Pause teaching procedure.

Groups	N	Mean	SD	df	t_{cal}	P
Experimental	104	31.86	13.57	206	.897	.345
Control	104	30.82	13.24			

P>0.05. N = Number of pupils; SD = Standard Deviation; Df = Degree of freedom

Table 2 shows $t\text{-}_{cal}$ value of 0.897 was not significant at 0.05 level of significance. Hence the null hypothesis is not rejected. That is, there is no significant difference in the performance mean scores of students in the Experimental and Control groups before treatment. This shows that the two groups were homogeneous at the commencement of the study.

Hypothesis 2: There is no significant difference in the performance scores of students exposed to Pauses teaching strategy and those in the control group after treatment.

Table 2: t-test Analysis of post-test Scores of Experimental and Control Groups on Pause teaching procedure

Groups	N	Mean	SD	Df	t_{cal}	P	Mean Difference
Experimental	104	55.43	16.30	206	36.605	.001	11.98
Control	104	43.45	7.27				

P<0.05. N = Number of pupils; SD = Standard Deviation; Df = Degree of freedom

Table 2 above shows that $t\text{-}_{cal}$ (36.605) is significant at 0.05 level of significance because the p-value of 0.00<0.05. hence the null hypothesis is rejected. Therefore, there was significant difference in the performance scores of students exposed to Pauses teaching strategy and those in the control group after treatment. The mean score (55.43) of the experimental group is greater than the mean score (43.45) of the control group by the mean difference 11.98 which is highly significant. This implied that the experimental group has better performance than the control group.

Hypothesis 3: There is no significant difference in the performance of male and female students under the use of pause procedure.

Table 3: t-test Analysis of Posttest Scores of Experimental Group by Gender on Pause Teaching Procedure

Variables	**N**	**Mean**	**SD**	**df**	**t_{cal}**	**P**
Male	52	55.79	17.73	103	1.516	.143
Female	52	55.08	14.89			

P>0.05. N = Number of pupils; SD = Standard Deviation; Df = Degree of freedom

Table 3 indicated that the t_{-cal} value of 1.516 was not significant at 0.05 level of significance. Also, the mean 55.79 of the male students is not statistically greater than the mean 55.0769 of the female students. Hence, the null hypothesis is not rejected. This means that there was no significant difference in the performance of male and female students under the use of pause procedure.

DISCUSSION

This study examined the effectiveness of pause teaching procedure on students' performance in Mathematics by comparing the results of pupils taught using pause procedure with another set of students taught using conventional strategy. The study aimed at enhancing results-oriented Mathematics classroom interaction with the adoption of pause-procedure strategy**.** The study analysed the data collected from pretest and posttest conducted on the samples. Also the performance of male and female pupils were compared for any significant effect of treatment.

The findings of this study showed that performance of the pupils in Mathematics was improved upon their exposure to treatment. This is in agreement with the consensus of Iyamuremye; Ndayambaje and Muwonge (2021) and Ayaz and Hanni (2015) that innovative teaching approach affects the performance of most students. It was observed that there was no significant difference in the pre-test performance scores of the students in the experimental and the Control groups before treatment. This showed that the groups were homogenous at the beginning of the research. The posttest data analyses of the study showed that there is significant difference in the performance scores of the students in experimental and control groups. This exhibited the effect of pause strategy and how it enhances students' performance in Mathematics. This is in consonance with the findings of Bachhel and Thaman (2014) in their work titled "Effective use of pause procedure to enhance students' engagement and learning" that Pause strategy helps learners to perform better in their studies.

The opportunity to interact and share ideas on given tasks by learners made the class interesting for them and they were relieved of boredom that could have characterized some classes in which teachers were centered. This is in accordance with the premise of Social Interdependence theory,

that positive interdependence promotes interaction where individuals are encouraged by the facilitating team-mates efforts to complete the given tasks. This also is in agreement with Popoola (2013) with the conclusion that there could be significant positive change in the performance of students in Mathematics as a result of the method used by the teachers. Also, Kolawole (2013) was of the opinion that when Mathematics teachers select appropriate strategies, it would bring about positive change in the performance of the learners in Mathematics. It was established that gender has no effect on pause procedure. His is in support of many researchers consensus that gender has no effects on some teaching methods (Febana, Makeleni & Masha, 2022; Awan & Azeem, 2017).

CONCLUSION

The study established the merits of pause procedure in the teaching and learning of Mathematics. Learners were able to interact and share knowledge gained before and during class activities under pause technique. Learners and teachers should advocate the use of pause strategy, for easy teaching and learning to facilitate better performance. Based on the findings of this study, it was concluded that the use of pause teaching strategy influence the performance of pupils in Mathematics positively.

Recommendations

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

- Mathematics teachers should adopt the use of pause procedure in the teaching and learning of Mathematics for better performance of pupils.
- Teachers of Mathematics should allow interaction among students for the benefit of knowledge sharing that will help the weak and the average performing students to perform better and to have interest in the learning of Mathematics.
- The curriculum planners should include the use of active strategy such as pause procedure in the content of the curriculum for better practice in the teaching and learning of Mathematics.

References

Abiam P.O & Odok J. K (2021). Knowledge and Practice of Wait-Time in Mathematics Classroom Instructions. *Global Journal of Educational Research*. 19(2), 159-166.

Akinwamide, C.O. & Popoola, A.A. (2013). Effects of Instructional Aids and Teachers' Facilitating Tasks on Primary School Students' Achievement in Mathematics in Ekiti State. *Research in Curriculum Studies (RICS)*, 9(1), 194-200.

Akinwamide, C.O (2021). Enhancing Better Attitude and Achievement in Mathematics Teaching and Learning through Task-oriented Approach. *International Journal of Educational Management (IJEM).* 19 (3) 149-156

Ayaz, Mehmet Faith & Hanifi Sekerci, (2015). The Effects of the Constructivist Learning Approach on the Students' Academic Achievement: A Meta-Analysis Study. Journal of Educational Technology. 14(4):145-156.

Andrews N; Ingram J; Pitt (2016). The role of pauses in developing students' explanations in Mathematics lesson: Charlie's Journey. British society for research into learning Mathematics 36(1) February 2016

Anthony G. & Walshaw M (2009). Characteristics of Effective Teaching of Mathematics: A View from the West. *Journal of Mathematics Education*. 2(2) 147-164.

Awan A.G & Azeem A.M, (2017). Gender Differences and Its Impact on Students' Performance: A Socio-Linguistic Analysis. *Global Journal of Management, Social Sciences and Humanities.* 3(2)352-372.

Bacheal R. & Thaman R.G (2014). Effective use of pause procedure to enhance students' engagement and learning: Journal of clinical & diagnostic research 8(8) XM01-XM03.

Charles Y.C. Yeh; Hercy N.H cheng; Zhi-Hong chen; calvin C.Y liao and Tak-Wai chan (2019). Enhancing Achievement and Interest in Mathematics Learning Through Mathematics-Island. *Research and practice in Technology*. (14)5 https://doi.org/10.1186/s41039-019-01009

Erdogan F. & Sengul S (2014). A Study on the Elementary School Students Mathematics Self Concept. *Procedia-Social & Behavioural Sciences.* 152 (2014) 596-601

Febana P, Makeleni S.I & Masha R.K, (2022). The Effects of Gender and Teaching Strategies on Senior Secondary School Learners' Academic Achievement in the Buffalo City Metropolitan Municipality, South Africa. *Journal of Research & Method in Education*. 12(2)49-56.

Ingram J & Elliot V. (2016). A critical analysis of the role of wait time in classroom interactions and the effects on students and teachers interactional behaviour. Cambridge Journal of Education 46(1) 37-53.

Iyamuremye E.,;Ndayambaje I., & Muwonge C.M, (2021). Influence of Teaching Approaches on Students' Performance in Mathematics: A Meta-Analysis of Quasi-Experimental Studies in Africa. Journal of Educational Studies in Mathematics and Sciences. 17(2), 2021.

Kolawole, E.B. (2013), Kolawole's Problem Solving Strategy (KPS). A Panacea to Mathematical and Life's Problems. *Standard Journal of Educational and Essay* 1(8) 131-141.

Kolawole, E. B. & Popoola, A. A. (2009). Four Ability Process Dimension (4APD) as a Function of Improving Teaching and Learning Mathematics in Ekiti state secondary schools. *Proceedings of Annual National Conference of Mathematics Association of Nigeria*.

Popoola, A. A. (2013). Teachers' Level of Understanding the Language of Mathematics as a Determinant of Students' Achievement in Mathematics in Nigeria. *Journal of Education and Practice*. 4(22): 97-104.

Rowe, M.B. (1976). The pausing principle-Two invitations to inquiry. Research on College Science Teaching, 5, 258-259

Ruhl K.L; Hughes C.A & Schlooss P.J (1987). Using the Pause Procedure to Enhance Lecture Recall. *Teacher Education and Special Education*. 10(1)14-18.

Ruhl K. L., Hughes C A. & Gajar A. H. (1990). Efficacy of the Pause Procedure for Enhancing Learning Disabled and Nondisabled College Students' Long- and Short-Term Recall of Facts Presented through Lecture. *Learning Disability Quarterly*. 13(1),55-64

Salih F.A (2019). Teaching by Pause Technique in the Classroom. *Dirasat, Human and Social Science*. 46(2), 817-821.

Su H.F; Ricci FA & Mnatsakanian M, (2016). Mathematics Teaching Strategies: Pathways to Critical Thinking and Metacognition. *Journal of Research in Education and Science* (IJRES). 2(1), 190-200.

Veesar MH & Khaskheli G A, (2019). Effects of Mathematics Strategies on Students' Motivation in Learning of Mathematics at Secondary Level. Journal of Education. 48(2019),63-80.

Yeh C.Y.C, Chen, HNH, Chen,Z.H, et al (2019). Enhancing achievement and interest in mathematics learning through math-island. *Research and Practice in Technology Enhanced Learning*. 14(5), 2019.