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EFFECTS OF TRAINING MODEL ON TEACHERS' CLASSROOM MANAGEMENT BEHAVIOURS, PUPILS' FEEDBACK AND ACHIEVEMENT IN BASIC SCIENCE, JOS SOUTH PLATEAU STATE NIGERIA

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ABSTRACT

The study investigated the Effects of a training Programme on Teachers' classroom management behaviours and pupils' feedback in basic science in Jos South Plateau state, Nigeria. The population comprised of primary five basic science teacher and pupils. A total of 12 teachers and 120 pupils form the sample for the study. The samples were randomly assigned into three experimental and one control groups comprising of three teachers and 36 pupils in each group, A pre-test-post-test randomized control group design was used. Observation of classroom interactions and Sound recorders were used to collect data on all verbal interactions between teachers and pupils. Bloom's and Blosser's category systems were used to analyze the type of questions asked by teachers and pupils. Two sets research assistants were used, the first sets was trained for one week to observe and record classroom interactions, while the second set was trained for two weeks to implement the training model. Pupils were giving unique identification numbers. A cool Edith programme was used to measure the unproductive wait time of teachers' questions and the length of response of pupil. Marking scheme was used to record correct feedback of pupils. Four research questions guided the study and two null hypotheses were tested at 0.05 levels of significance. Data were analyse using chi-square statistics. The results show that the Training programme produced a significantly positive effect on teachers' classroom management behaviours and of pupils' feedback. It was recommended that the programme be used to train both teachers and pupils in Basic schools in Nigeria.

KEYWORDS

Teachers, Classroom, Management Behaviours, Pupils' quality feedback and Achievement.

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Introduction

The current emphasis on learner centered teaching strategies in science classrooms is in realization that scientific processes play key role to scientific inquiry and promotes human development. This call is for pupils become architects of their science learning in schools to enable them explore their environment and improve on it as well as the quality of life in the society. This can be achieved through engaging pupils in carrying out science activities that enable them to determine course and effect relationships and analyzing feedbacks in order to make useful conclusions. Learner centered classroom interactions are mostly noisy and so require good classroom management and control by the teacher to make meaningful noise that promote thinking and achievements. This can be achieved when teachers give clear instructions to learners during activities and ensure that they follow the instructions, when teachers use productive questions to guide pupils in making discoveries as well as using managerial questions to maintain silence in the classrooms. Questioning in a well controlled classroom environment serve as catalysts in promoting quality investigations in science classroom and form the basis for promoting scientific processes and thinking. Questions convey messages that draw pupils' attention to the content of the lesson and challenge them to think and make discoveries. Expressing their understandings whenever questions are asked requiring pupils' explanations in response to questions is what is referred to as quality of feedback, while their scores in written science test are referred to as their achievement.

The purposes of oral questions in science classrooms include but not limited to challenging learners to express themselves when providing feedbacks but also help teachers assessed the strength of their teaching strategies and monitor their control over their pupils in the classrooms. The quality of feedback of Pupils can be demonstrated through their length of expression when responding to questions, the type of questions they initiate and asked as well as the correct responses they give to questions paused to them.

The quality of pupils' feedback in the classroom be describe in terms of retrieval of useful information stored in their long and short term memory faculties of the brain, organization of bids and pieces of these stored information before verbalizing the information in response to the question, correct response to the question asked, the length of time used in responding, and the types of questions initiated and asked by pupils in during classroom interaction (Chollom, 2016). The length of time used by pupils to retrieve information and the time taken to express self in response to teachers' question is largely determined by the type of question asked. Low-level questions demand specific whole answers, while high-level questions demand responses that express connection between ideas. Similarly, the wait-time of teachers' question depends on the type of question asked (Tekene, 2006). Hence, these also determine length of time of pupils' express themselves in response to questions. When adequate opportunities for self reflection and expression are provided, overt and covert engagements of pupils in classroom task are facilitated and effective communications are achieved (Chollom, 2008). When pupils initiate and asked thought- provoking questions in the classroom, it shows that pupils are thinking in line with the lesson. This situation can or may in turn lead to effective understanding of the lesson content. For teaching to be effective in science, both teachers and pupils must be active participants in carrying out the learning task and asking challenging questions to promote and maintain useful interaction in the classroom. This implies that basic science classroom interactions in Nigerian primary schools are to be done to facilitate good communication among teachers and their pupils (Osuafor & Okigbo, 2010). To achieve this objective, a skilful management of wait-time principles in the classroom is important and necessary.

Classroom management of a teacher is define terms of the clarity of instructions teachers give to pupils' to carry out science activities, engaging pupils in learning tasks and managing pupils'

thinking through evaluating their understanding in the classroom. This can be achieved through drawing pupils' attention to the lesson which include posing managerial questions that draw pupils' attention in the classroom and asking questions and giving every pupils equal opportunities to think towards finding solutions to the question as well as giving enough time to respond and also time to observed all sorts of response pause time a teacher allows before a pupil has finish responding to a question before the teacher react on the response of the pupil. This practice promotes quality interactions, responses and achievement in science. Unfortunately research by Chollom 2016), shows that most basic science teachers in Jos South Plateau state, Nigeria are deficient in management of productive classroom behaviours, while pupils achievements are mostly below average.

Similarly, Research by Chollom, Garba and Ozoji (2022) shows that even experienced science teachers do not plan for their lesson but resort to the use of chalk and talk methods in teaching science. Such teachers lack the capability to use productive teaching techniques that stimulate thinking and properly manage classroom behaviour in Basic Science and Technology classrooms. The results show that Classroom interactions in basic science and Technology in Jos south were characterized by unwanted noise form pupils, poor classroom management behaviours of teachers as well as punishment of pupils by teachers. The classroom management behaviours that were consider for this study includes the following.

Asking Questions using incorrect interrogative words or phrases - This art do not help pupils to differentiate between a question and a statement, know when a question is being asked and what type of response is expected of them.

Allowing student to make noise and too much punishment in the classroom - This art disrupt learning especially when a student is responding to question, noise can confuse the person responding and do not allow other pupils listening to hear and contribute to the response.

None or too much use of managerial questions in the classroom - Managerial questions are those questions asked to get pupils' attention and control in the lesson. Absence of it makes the classroom noisy with no sense of direction and most likely result to no learning at all, while too much use of managerial question at the expense of academics questions do not support proper management of students' thinking in the classroom.

Asking Questions and giving little or no Wait-time I - This act does not give the pupil responding enough opportunity to think and retrieve enough information to respond to the question they have been asked.

Allowing no student pause responds Wait-time - This happens when a pupil responding to the questions stop speaking, to think of what he/she had just said or perhaps may re-consider adding more points to complete their answers or change the initial answer completely, is taking to mean that the pupils has finished answering the question.

Not allowing enough Wait-time II - This act means when a teacher fail to allow pupils enough time after they stop responding to questions and the teacher just call another volunteers to add to the answer or re-answer the question posed to the class.

Not listening carefully to Pupils' Responses -The best way to know when and how to probe learners' deep understanding of learned concepts is to listen attentively to their responses. This act

enables basic science teacher to observe when a learner breaks his/her response and keeps silent in order to retrieve more information to continue with the response or when a learner stops speaking in order to change the entire answer to the question or has completed responding to the question, before the teacher decides the question to another learner, make any praise or encouraging remarks, check to make certain that children's responses match the level intended by the question. The teacher can probe them if the level is not appropriate Martin, Sxion, Franklin, & Gerlovich, (2005). Relevant literature suggests that the above challenges can be corrected and teachers' classroom management behaviours can be improved.

Similarly, Stahi (1995) invented the concept of "think-time" which he refers to as a distinct period of uninterrupted silence by teachers and all pupils so that they both can finish processing information and task oriented thinking activities before giving feedback to questions asked in the classroom. He proposed eight categories of period of uninterrupted silence that form the concept of 'think-time 'and demonstrate how the different period of pupils' responses to questions can be measured in the classroom.

Post-teacher questions wait-time. This refers to the time teachers' pause (on the average between 0.7 and 1.4 seconds), after asking a question and before permitting a pupil to respond.

Within pupils response pause–time. This occurs as a learner pauses or holds on during a previously started response or explanation to a question for up to more than three (3-5) seconds of uninterrupted silence before continuing the answer. No one except the student making the initial response has the potential to interrupt this period of silence, which may take more or less than 3 seconds. But the common practice is for teachers to interrupt or cut the pupils off from completing their responses, especially when the pause period is more than 5 seconds. Other pupils in the classroom also often seize the opportunity of the periods of silence by volunteering, without the teacher re-directing the question to them.

Post-student response wait-time. The three or more (3-5) seconds of uninterrupted silence occurs after a student has completed a response and while other pupils are considering volunteering their reactions, comments or answers. This period is characterized by allowing other pupils time to think about what has been said and to decide where they can contribute their own answers.

Pupils' pause-time. This occurs when a student pauses or stops speaking during a self- initiate question, comment or statement for three or more (3-5) seconds of uninterrupted silence before continuing with the self initiated question.

Student task completion wait-time. This occurs when a period of at least 3 – 5 seconds or sometimes up to two minutes of uninterrupted silence is provided for pupils to be on task. This period allows pupils to complete a short or lengthy academic task that demands their undivided attention before responding to mentioned but a few. Each period of uninterrupted silence should be appropriate to the length of time pupils need to complete a particular task.

However, the behaviourists believe that "training" can improve classroom behaviours of both primary school basic science teachers and pupils. Such acts are not only important but possible. Similarly, research by Gall (2006); and Tekene (2006) supported the position of the behavioural psychologists that "training" to improve the questioning behaviours of both primary school basic science teachers and pupils' questions are not only important but possible. In addition, Chollom, (2016) revealed that

training to improve classroom behaviours and use approaches other than lecturing during classroom interactions does not just improve pupils' responses but also improve their achievement in basic science and technology.

Therefore, the training Programme was an intervention programme designed based on the principles derived from the behaviourist and social cognitive interactionist theories, important classroom wait-time are categorised as follows: **1** which includes asking a question and allowing enough time before assigning pupils to respond (Critelli, &Tritapoe, 2010). This act gives every pupil equal opportunity to think about the kind of responses they give. The second is the post-pupils' response pause time, which is done to allow pupils enough time after they stop responding to questions before the teacher allows other volunteers to add to the answer or re-answer the question posed to the class(**wait-time II)**. The third important wait-time in the classroom is the pupils' response pause-time. This period is allowed so that the pupils can think of what they had just said. Perhaps, they may re-consider adding more points to complete their answers or change the initial answer completely (Chollom, 2013). Effective management of wait-time principles enables pupils to equip themselves with facts and to express their views, conceptions, perceptions and share their ideas clearly in response to the question posed to them by their teachers.

Research by Chollom, (2016), shows that primary five pupils in Jos South Plateau State hardly initiate good questions on their own in the classroom and they achieved poorly in science achievements. In an early research reviewed by Gall, (2006) reported that an average of less than one question per class was of pupils' initiation. Gall (2006) also recorded all talks in six junior high schools for a period of one week and found out that the ratio of pupils' questions to the total number of questions varied considerably between classes. In two English classes, pupils' questions accounted for 1% of all questions asked in the class. In seventh and ninth grades science classes, pupils' questions accounted for 17% and 11% of the total questions asked in the class respectively (Chollom, 2016).

The Problem - Research by Chollom (2013) shows that most basic science teachers in Plateau state engage in un-productive classroom behaviours associated with unproductive wait-time principles which includes: allowing pupils short or too long wait-time before responding to high-level questions and longer wait-time to respond to a low-level questions as well as allowing no wait-time at all, when teachers answer their own questions. This un-productive management of the wait-time do not give pupils adequate time to express themselves in response to teachers' questions. In the same vein, Research by Chollom (2016), shows that primary school pupils in Plateau state hardly initiate thought provoking questions on their own during basic science classroom interactions and they prefer to respond to questions that require specific 'YES or NO' answers. They hardly provide feedback to most thought-provoking questions posed to them by their teachers. The few feedbacks they gave as answers to questions were mostly wrong. The research also revealed that most primary school pupils achieve below average in basic science and technology. Hence, it is against this backdrop that the study is designed to determine the effects of a Training Programme on teachers' classroom management behaviours and quality of pupils' responses and achievement in basic science and technology.

Purpose of Study - The purpose of this study is to determine the effects of a Training Programme on teachers' classroom management and quality of pupils' responses in basic science classroom interactions and achievement. Specifically the study was designed to: determine the classroom management behaviours of basic science teachers in Jos South Plateau State, Nigeria; find out the average wait-time management behaviours of basic science teachers in the classroom in Jos-South

Plateau State, Nigeria; examine the types of questions initiated and asked by primary five pupils during basic science classroom interactions in Jos-South Plateau State, Nigeria; investigate the quality of responses to teachers' questions of primary five pupils during classroom interaction in Jos South Plateau State, Nigeria and to assess the trend in the achievement of pupils taught by teachers who were exposed to the treatment compared to those taught by teachers who were not exposed to the Treatment.

Research Questions. The study provided answers to the following questions:

Research question 1 - What are the classroom management behaviours of basic science teachers in Jos South Plateau State, Nigeria?

Research Question 2 **-** What is the average wait-time management behaviours of basic science teachers in the classroom in Jos-South Plateau State, Nigeria?

Research question 3 - what are the types of questions initiated and asked by primary five pupils during basic science classroom interactions in Jos-South Plateau State, Nigeria?

Research question 4 - what is the quality of responses to teachers' questions of primary five pupils during classroom interaction in Jos South Plateau State, Nigeria?

Research Question 5 - What is the trend in the achievement of pupils taught by teachers who were exposed to the treatment compared to those taught by teachers who were not exposed to the Treatment?

Hypothesis.

Ho 1

There are no significant differences between the science achievement of pupils in the three experimental and the control groups.

Ho 2

There are no significant differences between the pre-test and post-test science achievement of pupils in the three experimental groups.

Methodology - The study employs is a pure experimental design using the pre-test- post-test control randomized group treatments. The experimental and control groups were located at different schools consisting of male and female basic primary five pupils. Pre-test data were collected on all teachers and pupils to determine the base line data on their classroom management behaviours and pupils feedback to determine the type of training and techniques that were used for the training.

The Training Programme - The training programme is a behaviour modification model which creates awareness to the teachers on the benefits of good classroom management which comprise of management of interactions between teacher and pupils, pupils and pupils and pupils with instructional materials. These interactions include: use of guided instructions, asking questions, noise control, working examples and feedbacks to promote the achievement of teaching and learning goals. It creates awareness to teachers on their lapses in using productive classroom management behaviours, pupils' effective questioning as well as feedback and the role of productive wait-time in facilitating correct responses from pupils. The teachers were trained on how to use clear instruction, questions and use productive wait-time to guide pupils to make discoveries during science classroom activities, These

were achieved using techniques such as modelling, micro-teaching, systematic questioning and feedback, while the pupils were trained on how to follow instructions and use them in carrying out science activities, initiating and asking challenging questions, how to use different pause times when responding to questions as well as giving quality feedbacks when responding to questions paused to them in the classroom. The experimental schools were randomly selected from the same location and away from the control group to ensure easy transportation to the training centre non access to information about the training.

Two sets of research assistants were trained for the study. One set of three research assistants were trained on how to use digital recorders to record classroom interaction and how to use the Cool Edith programme to measure teachers' wait-time and pupils' response-time to teachers' questions, while the other set of two research assistants who were specialist of science education were trained on how to implement the behaviour modification package on the Teachers and pupils. Participants were randomised into two experimental and one control groups to ensure equivalence. The experimental group I comprised of three primary five science teachers and 36 pupils within the same location both teachers and pupils were exposed to the training. The experimental group II comprised of three primary five basic science teachers and 36 pupils from schools only the teachers were trained. Experimental group III comprised of three primary five basic science teachers and 36 pupils only the pupils were trained and group four comprised three primary five basic science teachers and 36 pupils both pupils and teachers were not exposed to the training programme(control group).

RESULTS - Results were presented after each research question asked and hypothesis tested.

Research question 1. What are the classroom management behaviours of basic science teachers in Jos South Plateau State, Nigeria? This research question was answered using frequency counts and percentages of classroom management behaviours of Basic Science teachers which were observed at pre-test and post-test classroom interactions carried out on the classes of twelve primary five basic science teachers and their pupils for six lessons each. Blosser's category system was used to separate academics questions from managerial questions.

Table 1- Pre-test primary five Teachers' Classroom Management Behaviours in Basic Science interactions

	INSTRUCTIONS			QUESTIONS			CLASS CONTROL		
GROUPS	Instructions	unclear Instruction		No of Questions asked	managerial Questions		Noise control	No of noise punished	
	F	F	%	F	F	%	F	F	%
experimental group 1	55	32	58.2	1369	89	6.5	60	11	18.3
experimental group 2	79	47	59.5	590	62	11	60	12	17.6
experimental group 3	59	33	55,9	488	82	17	67	14	20.9
control group	70	33	47.1	401	66	16	54	8	14.8
TOTAL	263	145	55.1	2848	299	10	241	45	18.7

Table 2- Post-test of primary five Teachers' Classroom Management Behaviours in Basic Science interactions

	INSTRUCTIONS			QUESTIONS			CLASS CONTROL		
GROUPS	Instructions	unclear Instructions		No of Questions asked	managerial Questions		Noise control	No of noise punished	
	F	F	%	F	F	%	F	F	%
experimental	1102	42	3.8	982	239	24	41	0	0

group 1									
experimental group 2	749	49	6.5	721	212	29	44	2	4.5
experimental group 3	65	31	47.7	497	105	22	68	26	38.2
control group	64	35	54.7	429	56	13	63	28	44.4
TOTAL	1980	157	7.9	2629	612	23	216	56	25.9

The results in Table 1 show that the following management behaviours were inherent in the basic science teachers' classroom interactions in both experimental and control groups. They include: inadequate and unclear instruction, questioning with less managerial questions, and less noise control. Interactions in these classrooms were characterized mainly as predominant lectures with uncontrolled noise and punishment. The results in Table 2 show a significant decreased in the percentages of occurrence in the unproductive management behaviours of teachers in experimental groups 1 and 2 compared to the percentages of occurrence on Table 1, while there was no improvement in the unproductive classroom management behaviours of basic science teachers in experimental group 3 and the control group.

Research Question 2: What is the average wait-time management behaviours of basic science teachers in the classroom in Jos-South Plateau State, Nigeria? In responding to this research question, data was collected on teachers' management of wait-time 1 and 2 during questioning interactions in the classroom. The length of time was divided by the number of questions asked to get the average wait-time of teachers' questions as shown on table 3 and 4.

Table 3 - Pre-test and Post-test Average Wait-time I of Primary five Basic Science Teachers' Questions

GROUP	**Pre-test**			**Post-test**		
	No of Questions asked F	wait-time I in Seconds/ Milli-sec S	Average wait-time I Of questions S	No of Questions asked F	length OF wait-time I in Seconds/ milli-sec S	Average length of wait-time 1 S
experimental group 1	1369	1660.653	1.213	982	3680.854	3.748
experimental group 2	590	917.103	1.554	697	2559.938	3.673
experimental group 3	488	997.959	2.044	681	1904.164	2.796
control group	401	711.935	1. 770	359	388.421	1.082
TOTAL	2848	4287.65	1.505	2719	8593.377	3.16

KEY F = Frequency, S = Second

Result on Table 3 shows that the pre-test average wait-time 1 of teachers' question was 1.505 seconds per a question while post-test average wait-time 1 of 3.160. The result shows an improvement on the management of wait-time 1 principle of teachers in classes 1-7. The result of teachers in classes 8-12 shows no improvement in teachers' wait-time I management.

Table 4 - Pre-test and Post-test Average Wait-time II of Primary five Basic Science Teachers' Questions.

Group	**Pre-test**			**Post-test**		
	No of Questions asked F	wait-time I in Seconds/ Milli-sec S	Average wait-time I Of questions S	No of Questions asked F	length OF wait-time I in Seconds/ milli-sec S	Average length of wait-time 1 S

experimental group 1	1369	1542.433	1.127	982	3749.349	3.82
experimental group 2	590	541.285	0.917	697	2183.964	3.13
experimental group 3	488	649.627	1.33	681	945.904	1.389
control group	401	572. 900	1.429	359	437.493	1.219
TOTAL	2848	2733.345	0. 960	2719	7316. 710	2.690

KEY F = Frequency, S = Second

Result on Table 4 shows that the pre-test average wait-time 1I of teachers' question was 0.160 seconds per a question while post-test average wait-time 1 of 2.690. The result shows an improvement on the management of wait-time 1I principle by teachers in experimental groups 1 and 2. The result of teachers in experimental group 3 and control group shows no improvement in teachers' wait-time management

Research question 3: what are the types of questions initiated and asked by primary five pupils during basic science classroom interactions in Jos-South Plateau State, Nigeria? This research question was answered using frequency counts and percentages of the pre-test and post-test observations of classroom interactions which were carried out in the sampled classes. Bloom's category system was used to analyze the type of questions pupils initiated and asked. The questions were categorize into higher and lower order questions.

Table 5 - Pre-test and Post-test Questions initiated and asked by Primary five Pupils during Classroom Interaction based on Bloom's Category System.

	PRE-TEST		POST-TEST	
	Lower order questions F	Higher order questions F	Lower order questions F	Higher order questions F
experimental group 1	1	4	24	81
experimental group 2	5	0	18	48
experimental group 3	1	0	38	74
control group	3	3	5	4
TOTAL	10	7	85	204

The pre-test results in Table 5 show that primary five pupils initiate and asked few questions during classroom interaction at pre-test. They asked two mostly lower order questions based on Bloom's category system, (knowledge and Application questions).The post-test results in Table 5 show that students in the experimental groups initiated more questions at post-test and majority of questions initiated and asked by primary five pupils during classroom interactions were application questions with few evaluation questions. However, a decrease in the number of lower order questions was observed at post-test in the experimental groups compared to pre-test results on Table 5.

Research question 4 - what is the quality of responses to teachers' questions of primary five pupils during classroom interaction in Jos South Plateau State, Nigeria? In answering this research question, data was presented on the number of teachers' questions that pupils attempted answering, the frequency of correct responses pupils gave to teachers' questions, the length of their responses, the number of pause-time observed within pupils' responses and average length of pause-time within pupils' responses were calculated.

Table 6 - Frequency and percentage of Correct Responses of Primary five School pupils to basic Science teachers' questions at pre- test and Post-test

PRE-TEST	POST-TEST

GROUPS	No of question asked F	No of questions answered F	%	No of question answered correctly F	%	No of questions asked F	No of questions answered F	%	No of question answered correctly F	%
EXP 1	1369	584	42.7	241	17. 6	982	763	78	545	56
EXP 2	590	289	49	129	21.9	533	103	19	37	6.9
EXP 3	488	291	59.6	116	23.8	447	313	70	261	58
Control	401	271	67.6	112	27.9	304	102	34	82	27

KEY

EXP = Experimental groups,

F = Frequency and

% = Percentage

The results in Table 6 show that the percentage of correct response of pupils to questions asked by their teachers during pre-test classroom interactions in the two experimental and control groups were generally low. Post-test result in Table 6 shows a improvement in the percentage of correct responses of pupils in the two experimental groups (classes of teachers 1 - 9) and a slide decreased in the percentage of correct responses of pupils in schools (9 – 12) of the control group compared to pre-test results.

Table 7 - Length of pupils' Response to basic Science teachers' questions at pre- test and post-test classroom interactions.

	Pre-test				**Post test**			
Groups	No of question asked F	No of questions answered F	Total time of response in seconds/ milliseconds S	Average length of pupils' response in sec S	No of question s asked F	No of questions answered F	total time of response in sec/milliseconds S	Average length of pupils' response in sec S
Experimental 1	1369	584	1618.243	2.75	982	663	5349.35	5.09
Experimental 2	590	289	406.885	2.24	533	335	2479.96	7.37
Experimental 3	488	391	697.627	2.99	447	313	1127. 70	3.56
Control group	401	271	835. 90	3.16	304	162	442.207	2.27

KEY F = Frequency and S = Second

The results in Table 7 show that the length of response of pupils to questions asked by their teachers during pre-test classroom interactions in the two experimental and control groups were 2.143 to 3.487 seconds. However, the Post-test result in Table 7 shows a improvement in the length of responses of pupils in the classes of teachers in the two experimental groups between 4.872 to 9.814 seconds. The result of pupils in the classes of teachers in the control group shows no improvement in the length of responses of pupils.

Table 8- Frequency and Length of pause-time observed within pupils' responses to teachers' questions at pre- test in seconds /milliseconds.

PRE--TEST	POST--TEST

GROUPS	Total time of responses in sec/ millisec S	No of within pupils' respond pause time observed F	Average length of within pupils' respond pause times in sec/ millisec S	Total time of responses in sec/ millisec S	No of within pupils' respond pause time observed F	Average length of within pupils' respond pause times in sec/ millisec S
experimental group 1	1618.243	3	0.452	5349.35	16	0.602
experimental group 2	406.885	1	0.204	2479.96	14	0.614
experimental group 3	697.627	3	0.434	1127. 70	10	0.553
control group	835. 90	2	0.339	442.207	1	0.108

KEY

F = Frequency, S =Seconds and Millisec = milliseconds

The pre-test results in Table 8 show that primary five pupils exhibited few within pupils' responses pause-time behaviours during their feedback to teachers' questions. The average response pause-time ranges from 0. 204 to 0.452 seconds respectively. The post-test results in Table 8 show that all primary five pupils in the classes of teachers in three experimental groups exhibited increased in the frequency of within pupils' responses pause-time behaviours during their response to teachers' questions, while in the control group, the within pupils' responses pause-time behaviours decreased. The average response pause-time ranges from 0. 108 to 0.614 seconds respectively. The results imply that when teachers are trained they become aware of the importance of pause time of pupils response to questions.

Research Question 5 - What is the trend in the achievement of pupils taught by teachers who were exposed to the treatment compared to those taught by teachers who were not exposed to the Treatment?

In answering this research question, the pre-test and post-test achievement scores of pupils in the experimental group II were compared to the achievement of pupils in the control group to determine the effects of the treatment on teachers questioning behaviours and its effects on pupils' achievement. This is because in group II, only the teachers were exposed to treatment, while those in the control group, both teachers and pupils were not exposed to treatment. Pre-test achievement scores of pupils in the classes of teachers in experimental group II and control group were computed to determine the pupils' base line data on achievement in science. After that the effects of treatment was measured on both groups. The results are presented in

Table 9.

Effects of the Treatment on the Achievement of Primary Five Pupils Taught by Teachers in Experimental group 3 and those in the Control group at pre-test.

	PRE-TEST			**POST-TEST**		
	Achievement mean score	Mode of Test scores	Standard deviation	Achievement mean score	Mode of Test Scores	Standard deviation
Only Basic Teachers Were Exposed to Training Model (experimental group II)	30. 60	29	10. 80	57. 00	55	15. 60

Teachers and pupils who were not Exposed to the Training Model (control group)	33. 20	40	9. 60	32. 40	36	10. 40

Pre-test mean, mode and standard deviation of pupils' Basic Science achievement test scores in Table 9 show that pupils in the two groups generally achieved below average in science test.
Pre-test mean, mode and standard deviation of pupils' Basic Science achievement test scores in Table 9 show that pupils in the two groups generally achieved below average in science test. However, post-test one result shows an improvement in the mean, the mode and the standard deviation of pupils in the experimental group, while the mean scores the mode and the standard deviation of pupils in the control group were below average.

Ho 1.

There are no significant differences between the science achievement of pupils in the three experimental and the control groups.

In testing this hypothesis, the Basic Science achievement test scores of pupils in each of the three experimental groups and the control group at pre-test were compared to determine if there was any significant difference at 0.05 level of significance, the scores were analyzed using ANOVA. Similarly, a comparison between post-test science achievement mean scores of pupils in the three experimental and the control groups was done to determine if there exist any significance difference at 0.05 level of significance in pupils' achievement mean scores after the treatment. The results are presented in Tables 10, 11, 12 and 13.

Table 10 - Relationship between Pre-test mean scores of Primary Five Pupils in the three Experimental and Control Groups.

Table 11 - Analysis of Variance of Pre-test Achievement Mean Scores of Primary Five Pupils in the three Experimental and Control Groups.

ANOVA

PRE-TEST SCORES

Data Set	Descriptive					
					95% Confidence Interval for Mean	
Score	N	Mean	Standard Deviation	Standard Error	Lower Boundary	Upper Boundary
Experimental group I	36	35	9.7599	1.627	21.6977	38.3023
Experimental group II	36	30.6667	10.73046	1.788	27.036	34.2973
Experimental group III	36	31.76	9. 37283	1.562	28.5787	34.9213
Control group	36	34.2778	9.52474	1.587	31.0551	37.5005
Total	144	32.9236	9.91861	0.827	31.2898	34.5574

Score	Sum of Squares	Df	Mean Squares	F	P	Significance
Between Groups	454.188	3	151.396	1.557	0.203	(insignificant)
Within Groups	113613. 72	140	97.243			
Total	14068.16	143				

The result in Table 11 revealed that there is no significant difference between the experimental and the control groups. The analysis of variance result indicated that the theoretical F value at 0.05 level of significance is greater (2.60) than the empirical F value (1.557). Also, on the basis of P value and the alpha which are 0.203 and 0.05 respectively, the study concluded that the null hypothesis be accepted or maintained. This result implies that the samples at pre-test were homogenous or equivalent.

Table 12 - Relationship between Post-test mean scores of Primary Five Pupils in the three Experimental and Control Groups.

	POST-TEST SCORES					
Data Set		Descriptive		95%confidence interval for mean		
Score	N	Mean	Standard Deviation	Standard Error	Lower Boundary	Upper Boundary
Experimental group 1	36	61.6944	13.34005	2.242	57.144	66.2453
Experimental group II	36	56.8611	15.31414	2.552	51.68	52.0427
Experimental group III	36	50.0556	9.32361	1.554	48.901	53.2099
Control group	36	31.9167	9.23155	1.539	28.793	35.0402
Total	144	50.1319	16.5044	1.376	47.413	52.8506

Table 13 - Analysis of Variance of Post-test Mean Scores of Primary Five Pupils in the three Experimental and Control Groups.

Score	ANOVA					
	Sum of Squares	Df	Mean Squares	F	P	Significance
Between Groups	18387.91	3	6129.303	40.267	0.0001	
Within Groups	20564. 583	140	146.89			
Total	38952.493	143				

Post-test I Results in Table 13 were subjected to analysis of co-variance test at 0.05 level of significance. The result shows that the calculated P value of 0.001 is significant beyond any reasonable doubt. Hence, there is a significant difference between the achievement of pupils in the three experimental and the control groups.

Hypothesis Two- There are no significant differences between the pre-test and post-test science achievement of pupils in the three experimental groups.

Here, the pre-test Basic Science Achievement test scores of pupils in the three experimental groups were compared to their post-test Basic Science achievement test scores at 0.05 levels of significance. The results are presented in Tables 53 and 54.

Table 14 - Pre-test and Post-test Achievement Mean scores of Primary Five Pupils in the three Experimental Groups.

Paired Samples	Statistics				
	Pairs	Mean	N	Standard Deviation	Standard Error
Experimental group I	Pre-test	35	36	9.76	1.62666
	Post-test	61.694	36	13.45	2.24168
Experimental group II	Pre-test	30	36	10.73	1.78841
	Post-test	58.861	36	15.31	2.55236
Experimental group III	Pre-test	31.75	36	9.373	1.56214
	Post-test	50.056	36	9.323	1.55377

Table 15 - Paired Sample Correlation between the three Experimental Groups.

	Paired Sample Correlation			
	Pairs	N	Correlation Coefficient	Significance
Experimental group 1	Pre-test Post-test	36	0.904	0.00124
Experimental group II	Pre-test Post-test	36	0.978	0.00134
Experimental group III	Pre-test Post-test	36	0.975	0.00133

(Raw Scores generated from Pre-test and post-test I of Pupils' Basic Science achievement test of the Study)

Level of Significance of test = 0.05

P Value = 0.001

Df = (N-1) = (N-1)

This results in Table 15 show that the calculated P value of 0.001 was significant beyond any reasonable doubt. Hence, there were significant differences between the pre-test and post-test mean scores of pupils in the three experimental groups.

Discussion of Results

The Pre-test results in Table 1 2, and 3 and 4 revealed that Basic Science and Technology teachers in the experimental and control groups were deficient in management of classroom behaviours which include: inadequate and unclear instruction giving to pupils in the classroom, poor questioning with less managerial questions, and noise control. These results support the outcome of research by Chollom (2013) which shows that most basic science teachers in Jos South Plateau state are deficient in management of productive classroom interactions. Similarly, the result also support the outcome of research by Chollom, Garba and Ozoji (2022) which shows that even experienced science teachers do not plan for their lesson but resort to the use of chalk and talk methods with poor management of students' thinking, science classrooms and teaching activities.

However, when the experimental groups were exposed to their different treatments, post-test results in Tables 3 and 4 show improvement in the classroom management behaviours of basic science teachers in the experimental groups 1 and 2 while there was no improvement in the classroom

management behaviours of basic science teachers in experimental group 3 and the control group, this may be because they were not exposed to the training.

Similarly, Pre-test results on Tables 5, 6, 7 and 8 show that primary five pupils poorly responded to teachers' instructions in the class. Pupils provide wrong answers to most questions asked by teachers in the class, they prefer to respond to yes or no questions. They hardly initiate questions for themselves and when they do they asked predominantly lower order question that do not challenge teachers and put them on task in the classroom. In the same vein, Pre-test mean, mode and standard deviation of pupils' Basic Science achievement test scores in Table 11 show that pupils in the experimental and control groups generally achieved below average in science test. The result in Table 11 revealed that there is no significant difference between the experimental and the control groups. The result revealed that the analysis of variance which indicated that the theoretical F value at 0.05 level of significance is greater (2.60) than the empirical F value (1.557). Also, on the basis of P value and the alpha which are 0.203 and 0.05 respectively, concluded that the null hypothesis be accepted or maintained. This result implies that the samples at pre-test were homogenous or equivalent. However, the findings of this result agree with the outcome of research by Chollom, (2016) also revealed that public primary pupils in Jos South Plateau state, Nigeria are deficient in initiating questions on their own during science classroom interactions and when they manage to initiate questions, the questions they asked that do not challenge their teachers to make research before teaching and they achieve below average in science and technology test scores.

Hence, post-test one result in Tables 3, 4, 5, 6, 7, 8 and 9 shows improvement in pupils' responses to teachers' questions which include increased in length of response, increased in number of correct answers, increased in the number and quality of questions pupils' initiated and asked; while there was improvement the mean, the mode and the standard deviation of achievement test scores of pupils in the experimental groups in Table 9 while the mean scores the mode and the standard deviation of pupils in the control group showed no improvement. However, the results in Table 15 show that the calculated P value of 0.001 was significant beyond any reasonable doubt. Hence, there were significant differences between the pre-test and post-test mean scores of pupils in the three experimental groups. This finding is in line with the views of the behaviourist and research result by Tekene (2006) that "training" to improve the classroom behaviours of both primary school basic science teachers and pupils are not only important but possible. This result supports the outcome of research by Chollom (2016), that when pupils were exposed to the treatments, their quality of responses improved. This evident as the post-test results show varying degree of improvement based on the treatment received.

Conclusion and Recommendations

Pre-test results in Tables 1-11 showed that Basic Science and Technology teachers and their pupils in Jos South are ignorant of the importance of classroom management behaviours and pupils on pupils' thinking and achievements in basic science and technology. After the treatment Based on the finding of this study, teachers' classroom management behaviours, pupils' responses, thinking and achievements in basic science and technology improved. It was recommended that both teachers and pupils in basic schools in Nigeria should be trained using the training Model such as this to improve teachers and students' classroom management behaviours and increase effective classroom interaction, students' thinking and achievement in science and Technology. The study recommends that Basic Science and Technology teachers in Nigerian basic schools should be exposed to training workshops by school heads to improve classroom interactions, pupils' confidence in responding to teachers' questions and improved achievements.

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