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Influence of Participatory Instructional Method on Pupils Performance in Science in Mbeere South Sub-County

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Abstract: ***In Kenya, and specifically to primary schools in Mbeere South, Performance in Science has showed persistent stagnation where the KCPE results over staggered years, 2009, 2011, 2012 and 2013 stagnated at around 50% mark. Such a poor trend needs a systematic investigation. Therefore, this research proposed to assess the Influence of Participatory Instructional Method on Pupils Performance in Science in Mbeere South Sub-County. The study was based on the Constructivism and the Pedagogical content theories that both explain learning of science. Mixed research methodologies were used to conduct the study in which both qualitative and quantitative data was collected. The study adopted a concurrent triangulation research design that involved the concurrent, but separate, collection and analysis of quantitative and qualitative data. The target population comprised of 1083 respondents comprised of 1080 Science teachers in primary schools within Mbeere South Sub-County, 2 quality assurance officers and 1 sub- county director of the teachers service commission. The sample size was 219 respondents which was arrived at through two stage geographic clustered sampling, simple random sampling and purposive sampling. To determine the sample size of teachers, 20% was sampled guided by postulations from guided by Gay (1976) while the others were arrived at purposively. The research instruments were a structured questionnaire, an observation schedule and a key informant interview schedule guide. Descriptive and inferential data analysis was done on quantitative data by help of computer software, the Statistics Package for Social Scientists (SPSS) version 22, and presented in frequency tables and co-efficient correlation respectively while thematic analysis was done on qualitative data and presented in narrative forms. The study revealed Participatory instructional method has the highest influence on pupils' performance in science. The study recommends that teachers should embrace learning experiences that promote pupils learning skills in science such as analyzing, synthesizing, and evaluation science knowledge. Government should hire more science teachers and increase funding for purchase of materials in order to boost the ability of schools to teach their pupils using participatory method.. Implementing recommendations of this study would help teachers' and education policy makers improve performance in science subjects in the Sub-County.***

Keywords: Participatory Instructional Method, Pupils Performance, Science subject

1. Introduction

Schools provide environments that shape children's behavior and future educational success. Teachers acts as catalyst of either positive or negative behavior modification to these children. The first years of schooling are critical to childrensince these years form the foundation of their educational life. Teachers must love their career in order for them to enthusiasticallyassist and provide a warm environment to the learners. Teachers spend a lot of time with their learners (Tarditti 2002). Moreover, the teaching methods are the complement ofcontent, just as instruction is the complement of curriculum (Petrina 2014). Teaching theories primarily fall into two categories: - teacher-centered and student-centered (Teach 2015). They could be classified as cooperative learning, brainstorming, direct teaching, lecture, lecture with discussion, multi-media and games (Kizlik 2014). They could also be looked as different models of teaching methods. The five models include didactic model that includes direct teaching. It is verbal and typically in the form of a lecture or presentation. There is modeling model which is direct teaching that incorporates visual and typically in the form of demonstration and practice. There is also managerial model which is indirect or interactive teaching. It includes facilitation, individualization and groupmanagement. There is also dialogic model that involves indirect interactive teaching; this engrains Socratic technique of dialogue, questions and thought provocations(Petrina 2014).

2. Literature Review

A study by Mayer, (2004)premised on whether there is sufficient research evidence to make any reasonable person skeptical about the benefits of discovery learning--practiced under the guise of cognitive constructivism or social constructivism--as a preferred instructional method. The research reviewed on discovery of problem-solving rules culminating in the 1960s, discovery of conservation strategies culminating in the 1970s, and discovery of LOGO programming strategies culminating in the 1980s. In each case, guided discovery was more effective than pure discovery in helping students learn and transfer. Overall, the constructivist view of learning may be best supported by methods of instruction that involve cognitive activity rather than behavioral activity, instructional guidance rather than pure discovery, and curricular focus rather than unstructured exploration. This study implied that a teacher is an important part in the learning. However, it failed to show the influence of different teachers' instructional methods on learning outcome, which was the main focus of this study.

A study by Morgan and Kingston (2005)that investigated the effects of different teaching styles on the teaching behaviors that influence motivational climate and pupils' cognitive and affective responses in physical education revealed that reciprocal and guided discovery styles resulted in more mastery and less performance-focused teaching behaviors and more adaptive cognitive and affective responses than the command/practice style. This study focused on physical

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education, but not on science subjects. In addition the study did not consider the influence of different instructional methods on learning performance of pupils.

3. Study Methodology

Research Design

The study adopted concurrent triangulation research design that allows Mixed-Methods Research Methodologies. According to Terrell (2012), this research design allows two concurrent data collection phases; a quantitative phase and a qualitative phase. Data is integrated during interpretation phase but can also occurduring analysis. Its primary purpose is confirmation, corroboration or cross-validation within a single study. The main strengths of the method arefamiliar to many researchers and take shorter data collection time when compared tosequential methods.

Target Population

The target population was all public primary schools' science teachers of Mbeere South Sub-County. Their total number is 1083 respondents. It also included two quality assurance officers and one Teacher Service Commission (TSC) Sub- county Director.

Research Instruments

The study collected both primary and secondary data. Collection of primary data involved the use of an observation schedule, questionnaires and key Informant Interviews. The main data collection instrument was the observation schedule. The researcher also collected secondary data from secondary source reports such as report forms and KCPE results from the schools.

4.

5. Discussion of Findings

Descriptive Statistics

The study findings found that majority (71.9%; n=151) of respondents either disagreed, (36.7% strongly disagreed, 35.2% disagreed) that pupils actively contribute ideas during science lesson. This implies that majority of respondent disagreed that pupils actively contribute ideas during science lesson. Robert Shostak (2003) describes the participatory method as one that permits open interaction between a learner and a learner as well as between teacher and the learner. It involves free flowing conversation, giving learners an opportunity to express their opinions and ideas, hear those of their peers and the teacher. The teacher does not take the leadership role but rather participates as a member of the group and everyone adheres to the guidelines for specified acceptable discussion behavior. The findings imply that this kind of learning is limited in the study area.

The study also found that majority (30.0%, n=63) of the respondents disagreed while 24.3% (n=51) strongly disagreed that pupils redirect comments and questions to other pupils which cumulatively gave 54.3% of respondents that disagreed. This implies that to a major extent, pupils do not redirect comments and questions to other pupils. According toTomlinson (2014),in an ideal situation, the goal of increasing participation is not to have every learner participate in the same way or at the same rate. Instead, it is to create an environment in which all participants have the opportunity to learn and in which the class explores issues and ideas in depth, from a variety of viewpoints; some learners will raise their voices more than others- this variation is a result of differences in learning preferences as well as differences in personalities. The findings shows that this is not happening in the schools and thus implies the learners are missing out on looking at science ideas from a variety of viewpoints. It further implies that participatory learning practices are not fully embraced in the targeting schools.

The findings further shows that 36.2% of respondents disagreed while 32.4% strongly disagreed, giving a majority (68.6%, n=144) that disagreed that teacher repeat pupil responses to summarize and clarify ideas. This implies that most teachers of science in the study area do not repeat pupils' responses to summarize and clarify ideas; which is an important practice in participatory learning. When students respond incorrectly or insufficiently to teacher questions, the teacher can feel disappointed because the teaching-learning process does not seem to be proceeding smoothly and efficiently. However, teachers must avoid the temptation to blame the student for not listening or processing the question well. Instead, the teacher should use incorrect responses as a means of ongoing assessment to determine students' needs and misunderstandings(Brookfield and Preskill 2012). This implies that there is a need to strengthen this approach in which the teacher repeats what the learner has said.

The findings further found that majority (64.8%, n =136) agreed, (40.5% agreed while 24.3% strongly agreed), that teacher listen carefully to pupil's questions and answers without interrupting. This implies that majority of teacher listen carefully to pupils' questions and answers without interrupting. A study by Elstgeest (2001)states that teachers need to listen carefully to what learners say and give them time to express themselves. Learners will only feel confident enough to offer answers if teachers are sensitive to each learner as they speak.

The findings also showed that majority (56.2%, n=118) of respondents agreed, (34.8% agreed while 21.4% strongly agreed) that teachers use verbal and non-verbal cues to encourage participation. This means that majority supported that teachers use verbal and non-verbal cues to encourage participation. According to Tomlinson(2014) teachers should not rely on the same volunteers to answer every question. They should respond to frequent volunteers in a way that indicates that they appreciate their responses, but want to hear from others as well. Teachers should also reduce students' anxieties by creating an atmosphere in which they feel comfortable "thinking out-loud," taking intellectual risks, asking questions, and admitting when they do not know something. This suggests that when teachers allow non-verbal communication, it encourages an atmosphere that is supportive of learning science. The findings imply that teachers use verbal and non-verbal cues to encourage participatory learning of science in the targeted schools.

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It also found that majority (56.2%, n=118) agreed, (31.4% agreed while 24.8% strongly agreed), that teachers use purposeful scientific experiments to link to scientific knowledge. This implies that most teachers in the targeted schools use purposeful scientific experiments to link to scientific knowledge as a practice for participatory learning. According to Millar (2004, October)the idea is that learners are taught to carry out their own scientific enquiries and so acquire scientific knowledge for themselves shows that practical work has a central role in any such vision of science education. This implies that teachers of science should be encouraged to continue linking purposeful scientific experiments to scientific knowledge as a way of building on participatory learning in the targeted schools.

Furthermore the findings found that majority, (69.0% n=145) disagreed (36.2% disagreed while 32.9% strongly disagreed) that the pupils are involved in higher order thinking such as analyzing, synthesizing, and evaluation. This implies that most ofthe pupils in the targeted schools are not involved in higher order thinking such as analyzing, synthesizing, and evaluation. While according to Bloom's Taxonomy these verbs are indicative of high level learningArmstrong, (2016) their lack during science lessons shows there is a need for teachers to embrace more of it in the study area.

Finally the study found that majority (67.6%; n=142) of respondents agreed (37.1% agreed while 30.5% strongly agreed) that the learners are involved in activities like reading, discussion, and writing. This implies that majority of pupils are involved in participatory learning through activities such as like reading, discussion, and writing.

Inferential Statistics

Table 1: Correlation of Participatory Teachers Instructional Method against pupil's performance in science subject

Variable		Pupil's Performance In Science Subject
Participatory Teachers Instructional Method	Pearson Correlation	.297**
	Sig. (2-tailed)	.037
	N	210
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 1 above shows that Participatory Teachers Instructional Method has a positive Effect on pupil's performance in science subject. The r value at 2-tailed test is 0.297 and 2-tailed significance of .037 that is below 0.05. This shows that Participatory Teachers Instructional Method has a fairly strongly positive effect on the Pupil's performance in Science.

Table 2: Model Summary Participatory Teachers Instructional Method against Pupil's Performance in Science

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.505[a]	.255	.109	1.027
a. Predictors: (Constant), Participatory Teachers Instructional Method				

Table 2 provides the R and R2 value. The R value is 0.505, which represents the simple correlation. It indicates a fairly strong degree of correlation. The R2 value indicates how much of the dependent variable, "pupil's performance in science", can be explained by the independent variable, "Participatory Teachers Instructional Method ". In this case, 25.5% can be explained, which is significant.

Table 3: Coefficients[a] Determination of Teachers' Participatory Instructional Method and Pupil's Performance in Science

Model1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.589	.966		2.682	.011
Teachers' Participatory Instructional Method	.304	.147	.346	2.076	.044
[a]. Dependent Variable: Pupil's Performance in Science					

Table 3 provides the information needed to predict Pupil's Performance in Science from Participatory Teachers Instructional Method. This was supported by a probability value of 0.011 at 95% confidence level, which is less than 0.05, and indicates that; overall, the model applied can significantly predict the outcome variable. Both the constant and Participatory Teachers Instructional Method contribute significantly to the model. The regression equation is presented as follows; Pupil's Performance in Science = 2.589+.304 (Participatory Teachers Instructional Method).

Qualitative Responses on Participatory Method

Qualitative data from the Key Informant (K01) showed that participatory instructional method would be the best teaching method because it allows learners to do discovery and also to have greater interest in the lesson and the topic. However, most teachers do not use the method because they are in hurry to finish the topic or due to lack of materials. This corroborates with views from Key Informant 2 (K02) who observed commented that:

'Time allocated to lessons is a limitation to the application of the method because in 35 minutes, teachers are under pressure to complete the syllabus therefore many do not use the method.

In addition to this, many schools lack the materials because their head teachers find it difficult to buy all materials needed due to limited funds. According to Key Informant 3 (K03):

'*Many teachers cannot devote themselves to participatory instructional method due to shortages of teachers in many schools because the government is not able to hire more. Where teachers are few, they tend to be overloaded and teach many classes in a day therefore they tend to use a method that can deliver to many pupils quickly. Teachers also tend to teach many subjects and therefore are not able to give proper attention to just one subject.*

This agrees with a study done by UNESCO that shows that where facilities and resources are available, a qualified and motivated science teacher will deploy methods that center on the learner. Such an approach emphasizes practical activities and has the pupils experimenting, solving problems, discussing with each other and involved in practical hands-

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on-activities. This approach stimulates curiosity, imagination and critical thinking (FEMSA 2010).

6. Conclusions

The study concludes that on use of teachers' participatory instruction method, the study concludes that pupils actively contribute ideas during science lesson and though they do not redirect comments and questions to other pupils. However, teachers repeat pupil responses to summarize and clarify ideas which are important practices in participatory learning. Teacher also do listen carefully to pupils' questions and answers without interrupting. They also use verbal and non-verbal cues to encourage participation. Teachers use purposeful scientific experiments too to link lessons to scientific knowledge. However, pupils are not involved in higher order thinking such as analyzing, synthesizing, and evaluation. The study concludes too that the students are involved in activities like reading, discussion, and writing.

7. Recommendations

Based on the findings, it the study concluded that the Government should hire more science teachers and increase funding for purchase of materials in order to boost the ability of schools to teach their pupils using participatory method and also Teachers should embrace pupil-focused learning experiences that promote pupils learning skills in science such as analyzing, synthesizing, and evaluation science knowledge.

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