



Effect of Mathematics and Science Teaching Styles of Female Facilitators on the Academic Performance of Lower Primary Pupils: A Case of Kpone-Katamanso District

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Article Info

ISSN (online): 2583-5289

Volume: 04

Issue: 02

March-April 2025

Received: 13-01-2025

Accepted: 15-02-2025

Page No: 01-09

Abstract

The purpose of this study was to find out the effect of Mathematics and Science Teaching Styles used by female facilitators on the academic performance of lower primary pupils in Kpone-Katamanso District. An overwhelmingly 96% of kindergarten and preschool facilitators (teachers) are women, according to a new report from the Wall Street Journal using 2023 data from the Bureau of Labor Statistics. This study focused on women because of these revealing statistics. The study used case study, non-probability and purposive sampling techniques in selecting the preschool facilitators in Kpone-Katamanso District to obtain data for the study. The sample size for the study was ten (10) female preschool facilitators. Interviews and questionnaires were the main data collection instruments used in this study. The data obtained were analyzed using content analysis, charts and percentages to find out the preschool facilitators' dominant teaching styles in mathematics and science. The results reveal the various mathematics and science teaching styles adopted by female facilitators in the lower primary schools and the best mathematics teaching styles used. It was revealed that most preschool facilitators used blended teaching styles in teaching mathematics and science. This was evident in the years of teaching experience. Interview guides made it clear for these facilitators to explain how their teaching styles are helping improve the academic performance of the pupils beyond their class. It was recommended that the Lower Primary Facilitators adopt and make good use of Inquiry- Based Learning and Problem-Based Learning because they promote STEM teaching. Subject teachers should be employed to handle the lower primary mathematics and science. For effective teaching and learning in schools, teachers must take the following into considerations, learning styles, diverse needs, cultural backgrounds, and personality difference.

DOI: <https://doi.org/10.54660/IJMCR.2025.4.2.01-09>

Keywords: Mathematics and Science Teaching Styles, Female facilitators, Concrete-Pictorial-Abstract (CPA), Inquiry-based learning (IBL), Problem Based Learning (PBL), Science, Technology, Engineering and Mathematics (STEM), Teacher-Led Explanatory approach (TLE), 5Es teaching model

1. Introduction

Mathematics serves as the foundation for numerous other academic disciplines, and its pedagogical approaches significantly influence the instruction of these topics. Accounting, economics, science, engineering, and technology are fundamentally dependent on mathematical and scientific principles and competencies (Gul, Khan, & Akhtar, 2020) ^[16]. Also, a strong foundation in mathematics and science will better prepare students for success in these subjects therefore preschool teachers have a daunting task to prepare fresh brains for the 21st century demand in STEM. It is obvious that students who struggle with mathematics and science in primary school are more likely to struggle in later years.

As a science and mathematics teacher myself for many years in the preschool, primary and high school department, it's easy to dream about the dynamite lessons you could plan and deliver if only you had a little more time up the sleeve. With time as a premium, it's not always possible to prepare cutting-edge resources and coordinate lengthy student-focused activities, this is because we are all human and we don't live in a perfect world. That doesn't mean your teaching and learning, delivery and overall output and input has to suffer. With my teaching experience so far, I can say science education is without problems especially at the preschool school level. Dogru and Kalender (2007) ^[9] stated that global study literature indicates significant similarities in the challenges and issues facing scientific education, particularly at the basic and secondary levels.

Nonetheless, the pedagogical approaches in mathematics and science significantly impact students' learning processes and self-efficacy. The course curriculum must be developed using a contemporary strategy that addresses the concerns of 21st-century educational trends (Gul, Khan, & Akhtar, 2020) ^[16]. Mathematics encompasses intricate abstract concepts, sophisticated computations, and specialized vocabulary, rendering it challenging for learners to approach the subject with complete confidence. Certain pupils encounter challenges attributable to the pedagogical approaches of educators. The research findings (Gul et al., 2020) ^[16] indicated that teaching styles affect the cognitive domain of learners. These researchers assert that instructional techniques either render students unengaged or foster robust critical thinking skills and cognitive growth. At the onset of the 21st century, Africa (specifically Ghana) required a transformation of traditional mathematics and science pedagogies into contemporary methods, frequently grounded in the constructivist paradigm, to enhance students' cognitive comprehension. In response to the initiative, several countries (e.g., Ghana, South Africa, Rwanda, Kenya, Ethiopia, Zambia, Zimbabwe, and Tanzania) have transitioned from a knowledge based curriculum to a competence-based curriculum by adopting and implementing innovative teaching methodologies, particularly in the fields of science and mathematics. Following the reform to transition from teacher centered to student centered approaches, Inquiry based Learning (IBL), the utilization of tangible manipulative, and the 5Es instructional model have become the preferred methodologies. Although Ward observed that some schools in Africa have embraced these teaching methods in the execution of competence based curricula, there is less knowledge regarding which teaching style most significantly influences student performance in African nations, particularly in Ghana and the Kpone-Katamanso District.

In the last ten years, academics and scholars have enhanced their understanding of effective pedagogical strategies in mathematics. The implementation of a suitable pedagogical approach significantly impacts mathematical performance and learning. Despite numerous research studies completed in recent years, the impact of mathematics instruction remains inadequately understood due to the variability in study outcomes. Researchers (Carbonneau et al. 2013) ^[6] have shown that interactive teaching methods can effectively impart various mathematical concepts, as published in the African Journal of Educational Studies in Mathematics and Science. Students with a strong foundation in mathematics and science during early education typically excel in higher

grades, likely due to effective teaching methodologies employed by educators in lower primary. This phenomenon warrants further investigation.

1.1 Statement of the Problem

Lower primary education majors are largely female and have the highest levels of mathematics anxiety of any college major. Mathematics anxiety manifest itself as an unpleasant emotional response to mathematics or the prospect of doing mathematics and is more common in women than men. Many researchers believe that a major factor in determining a student's tendency towards mathematics anxiety may be the mathematics attitudes of his/her preschool teachers. This theory focuses on the vicious cycle that could result from mathematics anxious preschool teachers creating mathematics anxious students who grow up to be mathematics anxious parents and teachers. From my personal experiences as a head teacher and mathematics and science teacher in Oxford Kingdom International School, I have noticed that many children learn mathematics and science right from home before they come to school; this is also supported by Hughes who argues that children acquire numerical knowledge before commencing formal education. Parents and older siblings instruct young children in basic mathematics using community resources. These students engage with tablets, games, and activities that enhance their arithmetic skills prior to attending school. However, majority of female colleague teachers who show mathematics anxiety during professional development trainings teach in lower primary. Some class teachers consult me for clarifications anytime they have difficulties in any challenging topics. Some students who passed through these female facilitators who refuse to seek clarifications due to pride or ego, show weak mathematics foundation while others have very strong mathematics and science foundation base on the teacher's eagerness to approach for clarifications. This gave birth to this study about female facilitators' mathematics and science teaching styles on the academic performance of lower primary pupils in Kpone-Katamanso District.

1.2 Purpose of the Study

The purpose of the study was to find out the effect of mathematics and science teaching styles used by female facilitators on the academic performance of learners in the lower primary at Kpone-Katamanso District.

1.3 Objectives

The specific objectives of this study were

1. To identify what mathematics and science teaching styles are being employed by the female facilitators in teaching mathematics and science in Kpone-Katamanso District.
2. To identify the best mathematics and science teaching styles of female facilitators that improve academic performance in Kpone-Katamanso District.

1.4 Research Questions

The study sought to: know

1. What teaching styles are being employed by the female facilitators teaching mathematics and science in lower primary in Kpone-Katamanso District?
2. Which teaching styles best improve the academic performance of lower primary pupils in mathematics and science in Kpone-Katamanso District?

1.5 Significance of the Study

Firstly, the findings from this study sought to help lower primary school facilitators adopt some effective teaching strategies and activities in helping to improve the understanding of pupils in mathematics and science concepts. The data obtained can also be used to design interventions to improve primary science teaching and learning in Kpone-Katamanso District and Ghana as a whole.

Secondly, this study gives insight to policy makers, curriculum developers and other educational stakeholders at various levels of educational administrations and female teachers taking measures to overcome the existing problems of low mathematical skills for primary pupils in Ghana. In addition, this study adds to the knowledge we have about the current teaching styles in mathematics and science for Ghanaian primary schools. Also, the study sought to indicate the best mathematics and science teaching styles employed by female facilitators in Ghana.

Finally, the study can be used as a reference to other researchers who want to do their research in teaching styles for lower primary pupils with high or low mathematical skills.

1.6 Limitations

The main challenge of the study was a delay in starting the investigation due to financial reasons. It took one week to get permission from the school authorities, all primary schools were on vacation for two weeks. Female facilitators' participation was another hurdle to cross, most of them were busy to engage and take part in the process. Some refused to answer questions or open for more details due to the fear of being investigated for other reasons.

1.7 Delimitations

This study was delimited to four primary schools located in Kpone-Katamanso District. Mathematics and science teaching styles of female facilitators and the effect on the academic performance of the lower primary pupils are the focus of the study. The study was planned to be finalized in two months though due to the delay of the permission obtained from school authorities and vacation, the study was done for three months. The study did not cover all the female facilitators in Kpone-Katamanso District hence four schools with a total of twenty female facilitators were considered.

2. Literature Review

2.1 Theoretical Framework

The study's theoretical approach centers on behaviorism and constructivism as learning theories. Behaviorism arises from a stimulus-response chain, with subsequent learning contingent upon the comprehension of prior concepts. The implementation of constructionism in educational environments has demonstrated the promotion of higher-order thinking skills, including problem-solving and critical thinking (Li, Cheng, & Liu, 2013) [22]. It is seen to foster a conducive environment replete with several tools for manipulation and comprehension development. The educator might offer inquiries to aid students in refining their reasoning and identifying any errors. The constructivist learning theory posits that all information is derived from a foundation of pertinent prior knowledge. Learning is predicated on the child's existing knowledge and builds upon pertinent prior understanding to acquire new information. Children are not *tabulae rasae*; knowledge cannot be

transmitted without the child interpreting it in accordance with their existing understandings. They possess a cognitive foundation that enables them to develop further knowledge. Thus, youngsters attain greater information or learn most effectively through the use of objects and the experiences derived from them. Piaget's contribution to constructivist pedagogy posits that knowledge is acquired through experiences derived from play, spanning from infancy to adulthood, which are essential for learning. Central to constructivist philosophy is the conviction that knowledge is acquired through purposeful and meaningful real experiences, along with the exchange of viewpoints regarding those experiences with others (Mayer, 2004) [24]. Constructivist philosophy has a longstanding history of implementation in educational programs for young children, however it is less commonly used in adult learning contexts. Philosophers contended that pupils, particularly those in primary school, possess an innate curiosity about the world, and providing them with guided tools for exploration would enhance their comprehension of it.

2.2 Conceptual review

According to Mazaheri and Ayatollahi, teaching styles are characterized as the preferred methods employed by educators to address challenges, execute tasks, and make judgments during the instructional process. Preschool educators significantly influence and leave lasting imprints on their students, which they carry throughout their lives. Heydarnejad characterized teaching styles as the personal attributes and dispositions of educators, manifested through their application of instructional strategies, activities, and methodologies in the teaching of particular subjects inside the classroom. Mathematics anxiety in female facilitators significantly influences a child's development when the facilitator harbors a dislike for maths. The teaching style encompasses motivation, personality, attitude, beliefs, and instructional tactics. Female facilitators with a robust background in reading disciplines will consistently eschew mathematics and science. The pedagogical approaches of educators reflect their conduct during instruction and are a primary determinant of student learning outcomes.

Numerous research (Akaazua et al. 2017; Ayaz & Sekerci 2015; Salingay & Tan 2018) [1, 3, 29] examine the impact of teaching methods on students' academic performance in mathematics and science at the lower elementary level.

The teaching methodologies identified as crucial for advancing cognitive development studies include (i) Concrete Pictorial and Abstract teaching methods, (ii) the 5Es model, (iii) Inquiry Based Learning (IBL), and (iv) Problem Based Learning (PBL) (Akaazua et al. 2017; Ayaz & Sekerci 2015; Ranjan & Padmanabhan 2018; Salingay & Tan 2018) [1, 3, 29, 28]. Science has transformed our lives and is essential for Ghana's future advancement. Mazaheri and Ayatollahi characterized teaching styles as the preferred methods employed by educators to address challenges, execute tasks, and make judgments during the instructional process. These chosen methods may be fruitless for her students in certain instances due to the facilitator's orientation, upbringing, comprehension, and pedagogical approaches. Science and technology constitute the foundation of a nation's social, economic, political, and physical development. It is an interminable creative endeavor that facilitates exploration and comprehension. It comprises a corpus of knowledge that seeks to elucidate and interpret facts and experiences.

The pedagogical approach encompasses motivation, personality, attitude, beliefs, and instructional tactics. The pedagogical approaches of teachers reflect their conduct during instruction and are a primary determinant of student learning outcomes. The Grasha Riechmann Teaching Styles encompass five dimensions: Expert Teaching Style, Formal Authority Teaching Style, Personal Model Teaching Style, Facilitator Teaching Style, and Delegator Teaching Style.

2.3 Empirical review

While student performance is influenced by various factors, teaching styles have a crucial impact in the effectiveness of mathematics and scientific instruction (Omotayo & Adeleke 2017) ^[25]. Ganyaupfu (2013) ^[15] asserts that students' academic failure is closely linked to the employment of inadequate instructional methods for imparting knowledge. Numerous research investigating the determinants of inadequate performance in Africa disproportionately highlight student motivation and negative mathematics attitudes stemming from ineffective teaching tactics, while the teaching styles of facilitators remain neglected.

Multiple research indicates that certain teaching methodologies influence mathematics performance by impacting student motivation and attitudes (Salingay & Tan, 2018) ^[29]. Carter (2016) ^[7] posits that students are motivated to study when they can engage with the content (concrete manipulatives), particularly those who struggle to grasp mathematical concepts (abstract manipulatives). Mathematics and science education should commence with familiar activities rather than foreign terminology and concepts. The utilization of tangible items (concrete manipulatives) alongside visual representations to symbols facilitates the learning of mathematics for students with problems (Salingay & Tan, 2018) ^[29]. Educators recommended the utilization of tangible resources to address any challenges students may encounter in studying arithmetic. Sarfo et al. (2014) ^[32] advocated for the implementation of the CPA technique to enhance students' comprehension of Algebra and to advance their cognitive grasp of fractions. Salingay and Tan (2018) ^[29] demonstrated that the integration of CPA with a Teacher Led Explanatory approach (TLE) enhanced learner performance more effectively than TLE alone.

Regrettably, only a limited number of African nations have embraced and integrated the CPA concept into their curricula. Ayaz and Sekerci (2015) ^[3] assert that the 5Es teaching model is highly recommended within a constructivist learning framework and is more effective in fostering mathematical achievement than traditional methods (Ranjan & Padmanabhan, 2018) ^[28]. While this approach enhances learners' performance, it requires considerable preparation time for 5Es-based classes (Enugu 2016) ^[10]. Carter (2016) ^[7] observed that students instructed through a Project Based Learning approach exhibited greater motivation and performance compared to those receiving teacher led instruction. Research indicates that the Problem-Based Learning (PBL) approach positively influences students' mathematical performance compared to conventional methods. Graham (2006) ^[13] emphasizes that blended learning aims to optimize both educational environments for improved learning outcomes.

The 2012 Chief Examiner's report from the West African Examination Council indicated that the performance standard in integrated science was inferior to that of prior years. The candidates in integrated science failed to apply scientific

knowledge to physical phenomena. Furthermore, the 2023 B.E.C.E. results were inferior to those of prior years, as stated in the report by the Chief Examiner of The West African Examination Council (2023). The Ghana Statistical Service's Population and Housing Census (2010, 2014) indicated that in 2010, 2011, 2012, and 2013, the failure rates in mathematics and science for candidates who sat for the B.E.C.E. were 47.43%, 37.05%, 47.29%, and 55.56%, respectively. This is exceedingly concerning, and the nation must reevaluate this matter with utmost scrutiny.

3. Methodology

3.1 Research Design

The method used to collect data was mixed. Mixed method research combines qualitative and quantitative method in ways that draw on the strengths of both traditions of inquiry. It is a clear step away from the boundaries and practices of those traditions, especially those linked to quantitative methods.

3.2 Study Area

The study was conducted in Kpone-Katamanso District Assembly in the Greater Accra region of Ghana. Kpone-Katamanso is located along the coast in the Greater Accra Region of Ghana and shares boundaries with Tema to the west, Dangbe West to the east, the Gulf of Guinea at the south and Akuapem South to the North. Kpone-Katamanso Municipal District is one of the twenty-nine districts in Greater Accra Region in Ghana. Originally it was formerly part of the then-larger Tema Municipal District, which was created by the former Tema District Council, until the eastern portion of the district was split off to create Kpone-Katamanso District on 28th June 2012, which was established by Legislative Instrument (L.I.) 2031; thus, the remaining part has been retained as Tema Metropolitan District. Kpone-Katamanso Municipal District was established by Legislative Instrument (L.I.) 2271 with Kpone as the capital town. There are 456 educational facilities in the District of which 89 are public and 367 are private. The study focused on Kpone Basic School and Katamanso Basic School all in the Kpone-Katamanso Municipal District (www.kpone-katamanso.gov.gh).

3.3 Population

The targeted population all the lower primary school female facilitators from Kpone Basic School and Katamanso Basic School. This study was composed of the female teachers from the selected schools in the Kpone-Katamanso District. However, the accessible population was ten (10) selected lower primary female facilitators from the District who teach Mathematics and Science. In this study, non-probability and purposive sampling techniques were used in choosing the participants for this study. Parahoo asserted that in nonprobability sampling, researchers utilize their judgment to select individuals for the study based on their understanding of the phenomenon. Utilizing purposive sampling, the researcher deliberately identified the preschool facilitators currently employed at the selected institutions. Convenience sampling was used in selecting the location for the study which was two basic schools from Kpone and two basic schools from Katamanso.

3.4 Instruments and data collection procedures

Primary data was collected by use of questionnaire and

interviews, filled by relevant parties to obtain ideas on what constitutes teaching styles of female facilitators in Kpone-Katamanso District. These were designed in both open and closed ended form. The method ensured a high proportion of responses and higher returns rate. The interview Method entailed face-to-face interactions with the facilitators in the selected basic schools in Kpone-Katamanso District. The questionnaires prepared by the researcher were shown to several experienced teachers including the head of the schools and the circuit supervisor who was once a class teacher. The supervisor of the researcher also gave his input into questionnaires, interview guides and made the necessary corrections to make sure that all items were valid. Based on their critics, the questionnaires and the interview guides were revised to achieve the purpose of the study. Most of the facilitators were active teachers in the field, some were highly praised by the Municipal Education Directorate for their dedicated service. This was to make sure that the facilitators really understand the curriculum and the (mathematics and science) subjects taught at the Lower Primary Schools.

The researcher gave an introductory letter to the school authorities to obtain permission for the study. On acceptance by the authorities, the major task of collecting data began. The researcher briefly interviewed the headmasters of the schools about the facilitators' competence and professionalism. The reliability was obtained by administering the same test twice or more to the same group of facilitators. The results obtained were compared to find out the extent to which the results for the two or more tests administered correlated. This study investigated the relationship between female teachers' teaching styles and student academic performance. It took the researcher one month to collect data for this study.

3.5 Data Analysis

The data collected were analyzed using both qualitative and quantitative methods. They were presented using tables, pie charts, narratives and statistical figures (percentages).

3.6 Ethical Consideration

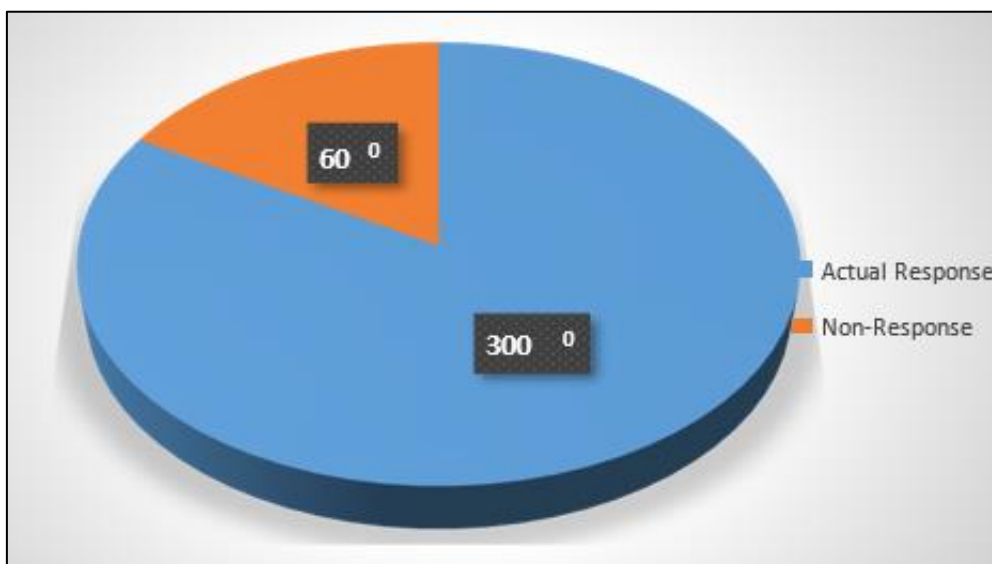
Written informed consent from the participants was required to participate in this study in accordance with the national legislation and the institutional requirements. The researcher ensured the freedom of participants by adhering to the principal of informed concerned. This principle required the researcher to ensure that participants are aware of the purpose of the study to get their concern and participate freely. The statement of the research purpose, description of any potential risks or discomforts, description of potential benefits and the description of confidentiality were assured to the respondents. The researcher assured them not to reveal their identity to anyone other than the researcher and his staff. These findings are stored in such a way that they will be accessible only for research purposes so as to maintain privacy or confidentiality and anonymity of the respondents in the researcher's personal computer with password.

4. Results and Discussion

4.1. Response Rate

4.1.1 Response Rate of the Targeted Sample

The targeted sample size was twelve (12) respondents, the researcher planned to get response from these twelve respondents. Out of these twelve (12) = 3600 respondents, ten (10) responded to the questionnaire equivalent to 3000 and two (2) respondents do not avail themselves as seen in the pie chart below.



Source: Researcher's Field Survey (2024)

Fig 1: Response Rate of Targeted Sample

4.2. Bio-Data Analysis of Teachers

Age of respondents

According to the study, 30% of the teachers who responded were below 30 years of age. This implies that they form the minority within the teaching staff. 40% of the respondents were between 31-35 years of age. 20% of the respondents were between 36-45 years. 10% of the respondents were over 46 years. This shows that the respondents cut across all the age groups as shown in table 1.

Table 1: Distributions of Staff by Age

Categories	Number of respondents	Percentage
Below 30 years	3	30
Between 31 – 35 years	4	40
Between 36 – 45 years	2	20
Above 45 years	1	10
Total	10	100

Source: Researcher's Field Survey (2024)

Staff experience

From the research findings it was established that 20% of the teachers have been teachers for less than 2 years, 40% of the teachers have been in the profession for 3-5 years, and 30% have worked for 6-10 years, 10% have been in the profession for 11 - 15 years. This shows that most of the facilitators in these lower primary schools can have a great influence on pupils' performance in mathematics and science learning as they are young. Hence the information obtained was highly credible as shown in table 2.

Table 2: Length of Staff Experience

Categories	Number of respondents	Percentage
0 – 2 years	2	20
3 – 5 years	4	40
6 – 10 years	3	30
Above 10 years	1	10
Total	10	100

Source: Researcher's Field Survey (2024)

4.3. Teachers' Analysis on Research Question 1 (Mathematics)

What teaching styles are being employed by the female facilitators teaching mathematics and science in lower primary in Kpone-Katamanso District?

The research question sought to know the various teaching styles employed by lower primary teachers. It also sought to know their favorite teaching styles in mathematics and how often they use this teaching style in teaching.

Response on how often CPA and use of Concrete Manipulative is used in teaching mathematics

Majority of responses represented by 60 percent indicated that 6 facilitators use CPA and Use of Concrete Manipulative very often. While 30 percent of the facilitators sample size indicated that CPA/use of Concrete Manipulative is used often. 10 percent sometimes use this teaching style as seen in table 3.

Table 3: CPA and use of Concrete Manipulative in teaching mathematics

Categories	Number of respondents	Percentage
Very often	6	60
Often	3	30
Sometimes	1	10
Rarely	0	0
Total	10	100

Source: Researcher's Field Survey (2024)

Response on how often Facilitators use 5Es Instructional Model in teaching mathematics

Majority of response represented by 50 percent indicated that 5 facilitators use 5Es Instructional Model very often. While 30 percent of the facilitators' sample size indicated 5Es Instructional Model is used often. 20 percent sometimes use this teaching style represented in table 4.

Table 4: 5Es Instructional Model in Teaching Mathematics

Categories	Number of respondents	Percentage
Very often	5	50
Often	3	30
Sometimes	2	20
Rarely	0	0
Total	10	100

Source: Researcher's Field Survey (2024)

Response on how often Facilitators use IBL/PBL Method in teaching mathematics

30 percent of the facilitators used IBL/PBL Method in teaching mathematics very often. While 20 percent of the facilitators sample size indicated IBL/PBL Method in teaching mathematics is used often. Majority of the facilitators representing 40 percent sometimes use this teaching style while 10 percent rarely use IBL/PBL Method in teaching mathematics as shown in table 5 below.

Table 5: IBL/PBL Method in teaching mathematics

Categories	Number of respondents	Percentage
Very often	3	30
Often	2	20
Sometimes	4	40
Rarely	1	10
Total	10	100

Source: Researcher's Field Survey (2024)

4.4 Teachers' Analysis on Research question 1 (Science) What teaching styles are being employed by the female facilitators teaching mathematics and science in lower primary in Kpone-Katamanso District?

The research question sought to know the various teaching styles employed by lower primary teachers. It also sought to know their favorite teaching styles in science and how often they use this teaching style.

Response on how often facilitators use Expert Teaching Style in teaching Science

Majority of responses represented by 30 percent indicated that Expert Teaching Style is used very often. While 20 percent of the respondents indicated that Expert Teaching Style is used often. 40 percent of respondents sometimes use this teaching style and 10 percent rarely use this teaching style as shown in table 6 below.

Table 6: Expert Teaching Style in teaching Science

Categories	Number of respondents	Percentage
Very often	3	30
Often	2	20
Sometimes	4	40
Rarely	1	10
Total	10	100

Source: Researcher's Field Survey (2024)

Response on how often facilitators use Formal Authority Teaching Style in teaching Science

From the research findings we can establish that majority of the female facilitators often use Formal Authority Teaching Style while 20% rarely use this teaching style as seen in table 7.

Table 7: Formal Authority Teaching Style

Categories	Number of respondents	Percentage
Very often	3	30
Often	4	40
Sometimes	1	10
Rarely	2	20
Total	10	100

Source: Researcher's Field Survey (2024)

Response on how often do Facilitators use Personal Model Teaching Style in teaching Science

In table 8, half of the respondents (50%) often use Personal

Model Teaching Style while 20% sometimes use this teaching style in teaching and 10% rarely use the Personal Model Teaching Style as shown in table 8.

Table 8: Personal Model Teaching Style

Categories	Number of respondents	Percentage
Very often	2	20
Often	5	50
Sometimes	2	20
Rarely	1	10
Total	10	100

Source: Researcher’s Field Survey (2024)

Response from the respondents on Facilitator Teaching style

From the findings, almost all respondents use Facilitators Teaching Style in teaching science with 80% response while 10% sometimes use this teaching style as shown in Table 9.

Table 9: Facilitator Teaching Style

Categories	Number of respondents	Percentage
Very often	8	80
Often	1	10
Sometimes	1	10
Rarely	0	0
Total	10	100

Source: Researcher’s Field Survey (2024)

Response on Delegator Teaching Style

According to the findings, Delegator Teaching Style is rarely used with the highest respondents of 60%. 30% of the respondents sometimes use this teaching style while 10% often use the Delegator Teaching Style as shown in table 10.

Table 10: Delegator Teaching Style

Categories	Number of respondents	Percentage
Very often	0	0
Often	1	10
Sometimes	3	30
Rarely	6	60
Total	10	100

Source: Researcher’s Field Survey (2024)

Blended Teaching Style

From most respondents the researcher interviewed mentioned a blended teaching style. This suggests that the respondents do not stick to one teaching style in mathematics or science particularly.

Response on Blended Teaching Styles

All 10 respondents use the blended teaching style to teach mathematics and science.

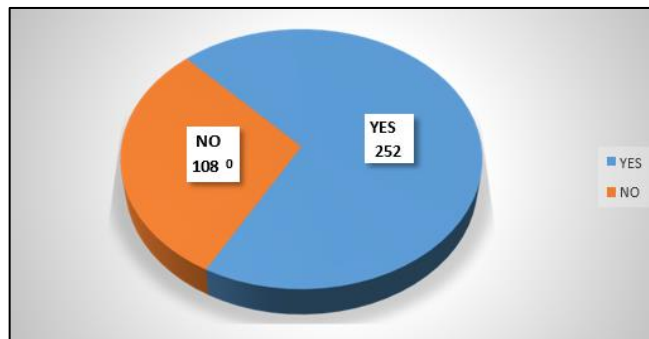
4.5 Analysis on Research Question 2

Which teaching styles best improve the academic performance of lower primary pupils in mathematics and science in Kpone-Katamanso District?

This research sought to find out the best teaching styles that improve the academic performance of lower primary pupils in mathematics and science. It sought to find out that the best teaching styles are often used in teaching lower primary pupils.

Response on how Teaching Styles Affect Performance in Mathematics

Out of 10 respondents, 7 respondents representing 2520 said that teaching styles had an impact on mathematics performance of pupils. While 3 respondents representing 1080 said that performance was not affected by the teaching styles employed, this is shown in figure 2.

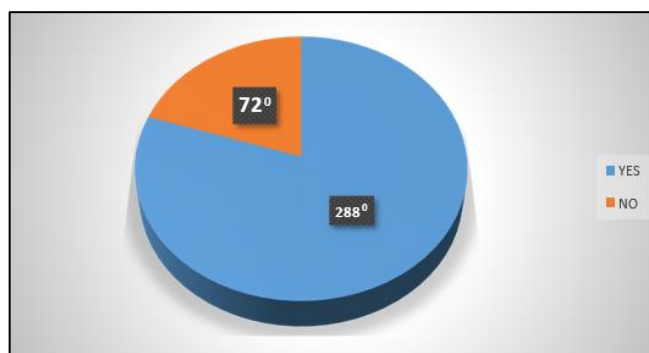


Source: Researcher’s Field Survey (2024)

Fig 2: Response on how teaching methods affect performance in mathematics

Response on how Teaching Styles Affect Performance in Science

Out of 10 respondents, 8 respondents representing 2880 said that science teaching styles had an impact on academic performance of pupils. While 2 respondents representing 720 said that performance was not affected by the teaching styles employed by facilitators as seen in chart 3.



Source: Researcher’s Field Survey (2024)

Fig 3: Response on how Teaching styles affect performance in science

Preferred and Dominant Teaching Styles in Mathematics

Out of 10 respondents, 60% use CPA and Use of Concrete Manipulative, 30% employ 5E Instructional Model and only 10% responded using IBL/PBL Method as evident in table 11.

Table 11: Preferred and Dominant Teaching Style

Categories	Number of respondents
CPA and Use of Concrete Manipulatives	6
5E Instructional Model	3
IBL/PBL Methods	1
Total	10

Source: Researcher’s Field Survey (2024)

Preferred and Dominant Teaching Styles in Science

Out of 10 respondents, half (50%) prefer Facilitator Teaching Style while 20% prefer Personal Model Teaching Style and

10% prefer Delegator Teaching Style, Expert Teaching and Formal Authority Teaching Style respectively as shown in the table below.

Table 12: Preferred and dominant Teaching Styles in Science

Categories	Number of respondents
Expert Teaching Style	1
Formal Authority Teaching Style	1
Personal Model Teaching Style	2
Facilitator Teaching Style	5
Delegator Teaching Style	1
Total	10

Source: Researcher's Field Survey (2024)

4.6 Discussions

The discussions of the findings were done alongside the research questions.

What teaching styles are being employed by the female facilitators teaching mathematics and science in lower primary in Kpone-Katamanso District?

From the findings, the 5E teaching style leads to a more effective, efficient, and enjoyable teaching experience. This is because it improves learners' engagement by encouraging active participation and motivation, helps students develop a deeper understanding of concepts and encourages students to apply what they have learnt. This result affirms to Ayaz and Sekerci (2015) [3]. According to their study, the 5Es teaching model is one of the most recommended teaching methods within a constructive learning approach and is more effective in promoting mathematical success compared to traditional methods and this was in accord of Ranjan & Padmanabhan (2018) [28].

However, Female facilitators prefer using CPA approach in helping students because, this approach helps students develop a deep understanding of mathematical concepts, starting with a concrete idea, then visualizing it, and finally applying it to abstract problems and this corroborate with Sarfo et al. (2014) [32] who suggested that, From the findings, female facilitators prefer this teaching style and this is evident in the response rate in table 3 above.

In teaching science, the female facilitators prefer the facilitator teaching style to any other teaching style. This is because it is a student-centered approach where the teacher acts as a guide or a mentor, facilitating learning rather than lecturing. The main strength of the Facilitator Teaching Style is that the personal flexibility given by teachers is focused on the needs and objectives of pupil learning according to Bergil & Erçevik (2019).

Which teaching styles best improve the academic performance of lower primary pupils in mathematics and science in Kpone- Katamanso District?

CPA caters to various learning styles, engaging visual, auditory, and kinesthetic learners. The best teaching style that improves the academic performance of lower primary pupils in mathematics and science may not be one teaching style but synchronize the instructions that incorporates elements of other teaching styles, online learning, and technology-enhanced pedagogies. Students learn in different ways-some prefer visual aids, others auditory methods, and some benefit from hands-on experiences.

This conclusion aligns with Graham (2006) [13], who emphasizes that blended learning aims to enhance both contexts for improved learning outcomes. By integrating

synchronous and asynchronous approaches, educators can more effectively cater to unique student requirements. In a blended setting, students encountering difficulties with a subject can use online resources outside of class, while class time can be dedicated to addressing particular concerns.

5. Conclusions

From the findings, it can be concluded that teaching styles come with experience and the more knowledge acquired in the field helps in imparting knowledge into the pupils. No one teaching style is enough to make a learner perform academically. Children are unique individuals with different learning styles, abilities, and personalities. What works for one child may not work for another. Mostly the facilitators at the Lower Primary are mainly females with mathematics anxiety. Therefore, to be effective, teachers should be flexible and use a variety of teaching styles to reach all learners.

5.1 Recommendations

Based on the findings of the study, lower Primary Facilitators should adopt and make good use of the Inquiry-Based Learning and Problem-Based Learning because this was given a little attention. These two approaches actively promote STEM teaching because of their ability to lead to the competence and skills needed by technologically advanced societies (Harlen, 2013). Secondly, subject teachers should be employed to handle the lower primary mathematics and science. This is because the learners at this grade are rapidly developing their mental abilities to think in mathematical and scientific ways to explore and understand their favorite topics. Lastly, for effective teaching and learning in schools, teachers must take the following into considerations; learning styles, diverse needs, cultural backgrounds, and personality difference. By incorporating multiple teaching styles teachers can create an inclusive and effective learning environment that supports the diverse needs of all children.

6. References

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