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Improving Basic 5 Pupils' Performance in Addition of Fractions of Like and Unlike Denominators using Fraction Paper Strips

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ABSTRACT: The study sought to improve the performance of Basic 5 pupils of Assin Edubiase Methodist Primary School in Assin South District in the concept of addition of fractions of like and unlike denominators using fraction paper strips intervention activities. An action research was the design used for this study. A total of 30 Basic 5 pupils comprising of 16 girls and 14 boys; with an average age of 10 years were used for the study. Test and interview were the 2 instruments used for the study. Data analyses were done using both quantitative and qualitative methods. It was observed that poor methods used in teaching addition of fractions was the major cause of Basic 5 pupils' inability to perform addition of fractions of like and unlike denominators. Other causes include lack of parental support; inappropriate use of TLMs to teach addition of fraction and lack of required text books. Also, it was observed that using real objects and recreational mathematics puzzles/games were some of the strategies that can be used by teachers to improve teaching of mathematics in schools. It was observed that pupils' performance had improved better after been exposed to the intervention; and also, pupils were happy in using fraction paper strips to learn addition of fraction concept. It was recommended that mathematics teachers should adopt innovative and effective methods such as the fraction paper strips to enhance teaching and learning of addition of fractions in Basic schools. Also, parents should do well to support their wards in schools through provision of resources and also assist them to do their assignments.

KEYWORDS: Improving, performance, fractions, like and unlike denominators, fraction paper strips

I. INTRODUCTION

There cannot be any meaningful development in virtually an area of life without the knowledge of mathematics (Churcher & Adjabui, 2015). It is a well noted and accepted fact that development in almost all spheres of life rests on effective knowledge of mathematics (Cathcart, Pothier, Vance & Bezuk, 2006). Mathematics as a subject of study enables the individual to develop logical thinking abilities (Fazio, & Siegler, 2011). This is to say that mathematics by its very nature follows logic and so are those who study it. In this way, the individual becomes capable to stand on his/her own accord to solve the numerous problems found his/her environment.

The study of mathematics is required of every child so as to live a normal life (Asafo-Adjei, 2001). Furthermore, the entry requirements for higher educational institutions in Ghana and elsewhere for some time now include a good pass in mathematics. Thus, if an individual fails in mathematics, then he/she cannot proceed in his/her education; and then the future of that individual may be bleak. The National Council of Teachers of Mathematics (NCTM), (2007) stated that being mathematically illiterate is as limiting as being unable to read and write. This shows how important mathematics is for the survival of the human race.

Fraction is one of the essential topics under mathematics that most students have difficulties with globally (Fazio & Siegler, 2011; Way, 2011). The problem of fractions in both Basic and Senior High schools (SHS) is a household fact

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and cannot be denied. According to Fazio and Siegler (2011), students around the world have difficulties in learning about fractions; and that in many countries; the average student never gains a conceptual knowledge of fractions.

The National Assessment of Educational Progress (NAEP) reports showed that “fractions are difficult for children to master” (NAEP, 2001). On their part, Bezuk and Kramer (1989) argued that it is unsurprising that children find fractions so difficult considering the complexity of the concepts involved. For example, $\frac{1}{4}$ is not greater than $\frac{1}{2}$, yet 4 is greater than two.

A presentation made by Anamuah-Mensah and Asabere-Ameyaw (2007) on science and mathematics in Basic schools in Ghana indicated that operations of fractions are areas of weakness in mathematics especially fractions involving like and unlike denominators. This is due to the abstract nature in which fractions have been presented to the pupils over the years. In a study, Fazio, and Siegler, (2011) posited that in many countries, the average student never gains a conceptual knowledge of fractions. For example, on a national test, only 50% of American 8th graders correctly ordered three fractions from smallest to largest (NCTM, 2007).

Studies by (NCTM, 2007; Way, 2011) indicated that students in these schools should acquire a deep understanding of fractions and be able to use them competently in solving problems. The questions then is “what then is the importance of fractions and how should it be taught in school”?

The fraction concept just as the mathematics itself is very important in our daily life activities such as sharing, comparing and measuring (Fazio & Siegler, 2011); and also perform life activities such as cooking, driving, etc (Asafo-Adjei, 2001; NCTM, 2007). Thus, the importance of fraction as a mathematical concept to students cannot be overemphasised.

Studies by (Charalambous, & Pitta-Pantazi, 2007; Fazio & Siegler, 2011) have revealed that children should be introduced to fractions at an early age by building on their informal understanding of sharing and proportionality. In another study, Lamon (2005) opined that understanding of fractions among students would enable them develop algebraic thinking better and use them effectively in their lives and also building on their informal understanding of sharing and proportionality.

Since, children need knowledge in fractions at the early stage to build on their informal understanding of sharing and proportionality; be able to see the real world connections and also apply them effectively in their daily life activities; it is imperative to provide Basic 5 pupils of this school with a wealth of concrete experiences to understand and perform better in the fractions concept.

It is upon this premise that this study was conducted to help solve the Basic 5 pupils’ problem and improve on their performance in fractions.

Statement of the Problem

The study of fractions is a fundamental topic in mathematics, yet it is among the most difficult topics in mathematics for Basic 5 pupils of Assin Edubiase Methodist Primary School. Majority of the Basic 5 pupils in the school have difficulties in adding fractions of like and unlike denominators whenever they encounter any problem on fractions they become wanting.

This became evident during interactions with the pupils coupled with exercises and assignments given to them on fractions. Only few pupils attempted questions on fractions and most at times got confused along the line.

Studies (Bezuk & Kramer, 1989; Maharaj, Brijlall & Molebale, 2007) revealed that mathematics achievement in the classroom is enhanced through the long-term use of concrete instructional materials that are made available by the teacher.

Numerous studies by (Cramer & Wyberg, 2009; Moat; 2012) have shown that ‘fraction paper strips’ are important aids that could be used to teach and help improve Basic schools pupils’ performance as well as interests and participation in the addition of fractions of like and unlike denominators.

Since fraction paper strips can be used to improve Basic school pupils’ performance and participation in the addition of fractions; it is in the light of this that this study was undertaken to help improve Basic 5 pupils’ of Assin Edubiase Methodist primary school conceptual understanding in the addition of fractions of like and unlike denominators using fraction paper strips as intervention strategy.

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Purpose of the Study

The study sought to improve the performance of Basic 5 pupils of Assin Edubiase Methodist primary school in the addition of fractions of like and unlike denominators using fraction paper strips. Specifically, the research intends:

1. To assess the possible causes of Basic 5 pupils' inability to solve addition of fractions of like and unlike denominators.
2. To find out the strategies used by mathematics teachers to improve the pupils' performance in mathematics in schools.
3. To evaluate the impact of fraction paper strips on pupils' performance in solving addition of fractions of like and unlike denominators.

Research Questions

The study was guided by the following three (3) research questions:

1. What are the possible causes of Basic 5 pupils' inability to perform addition of fractions of like and unlike denominators?
2. What strategies do mathematics teachers use to improve pupils' performance in mathematics in schools?
3. To what extent would the use of fraction paper strips enhance pupils' performance in the addition of fractions of like denominators and unlike denominators?

Significance of the Study

The outcome of this study will help Basic 5 pupils of Assin Edubiase Methodist primary school to erase their misconceptions and difficulties they have on the concept that seems to confuse them; and perform better in tasks involving addition of fractions with no difficulty.

The study will also make recommendations that will assist mathematics teachers to improve on their strategies in the teaching of the concept using fraction paper strips.

Finally, it will serve as a source of reference for those who wish to use similar approach to improve pupils' performance in the concept under study.

II. REVIEW OF RELATED LITERATURE

This chapter presents the review of related literature that supports this study. It covers the following sub-headings: -

- 1) Causes of Pupils' Inability to Perform Addition of Fractions.
- 2) Strategies Used to Improve Pupils' Performance in Mathematics in Schools
- 3) Impact of Fraction Paper Strips in Improving Pupils' Performance in Fractions

Causes of Pupils' Inability to Perform Addition of Fractions

Studies by (Hallahan, 2005; Anamuah-Mensah & Asabere-Ameyaw, 2007; Appiahene, Opoku, Akweitley, Adoba & Kwarteng, 2014) have indicated that there are several factors that cause pupils' inability to solve addition of fractions of like and unlike denominators.

In their report, Anamuah-Mensah and Asabere-Ameyaw (2007) mentioned pupils' misconceptions as the cause of pupils' inability to do addition of fractions. Asafo-Adjei (2001) also observed that lack of parental support and lack of motivation as major causes. Hallahan (2005) on his part attributed the causes to pupils' poor health and developmental defects as such as poor vision and hearing impairment.

In a recent study, Appiahene et al (2014) also mentioned lack of good teaching and learning materials (TLMs), lack of required textbooks, use of abstract concepts in teaching, bad teaching methods, poor attitude towards teaching by teachers, poor attitude towards mathematics by students, unseriousness on the part of students and poor supervision by school authorities as some of the causes of pupils' difficulties in studying fractions.

Vosniadou and Staphylidou (2004) also attributed this problem to improper sequencing of fraction lessons. Studies by (Siegler, Fazio, Bailey, & Zhou, 2013) attributed it to pupils' or students' earlier erroneous assumptions that properties of whole numbers are properties of all numbers; and also confusable relations among fraction arithmetic procedures.

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Strategies Used to Improve Pupils' Performance in Mathematics in Schools

Researchers (Suydam & Higgins, 1977; Cockrost, 1982; Grouws & Cebulla, 2000) have mentioned strategies that could be used by teachers to improve pupils' performance in mathematics.

Suydam and Higgins (1977) concluded that using manipulative materials produces greater achievement gains than not using them. Cockrost (1982) said eclectic approach should be used in teaching mathematics in schools. On his part, Bird (1985) added that the teaching and learning of mathematics should be activity-oriented where the pupils will be actively involved in the lesson.

Other study by (Cockrost, 1982; Grouws & Cebulla, 2000; Asafo-Adjei, 2001) mentioned that provision of physical facilities such as demonstration rooms; adoption of appropriate teaching strategies such as given exercises, project work and field trips are some of the strategies that can be used to develop pupils' interests in mathematics.

Studies by (Grouws & Cebulla, 2000) indicated that using calculators in the learning of mathematics; giving students both an opportunity to discover and invent new knowledge and whole-class discussion following individual and group work improves student achievement.

Nabie, Akayuure and Sofo (2013) believed that pupils' performance can be improved by integrating problem solving and investigations into mathematics teaching and learning.

In learning addition of fractions, pupils have a lot of misconceptions and that teachers should pay much attention to the misconceptions; discuss and correct pertinent misconceptions about fraction arithmetic among pupils (Vosniadou & Staphylidou, 2004).

Impact of Fraction Paper Strips in Improving Pupils' Performance in Fractions

The National Council for Teachers of Mathematics and Curriculum Evaluation Standards (1989) recommended the use of fraction paper strips and other representations to help children improve their understanding in fraction concept. The three (3) commonly used representations are:

- 1) Area models (e.g. fraction circles, paper folding, geoboard),
- 2) Linear models (e.g. fraction strips, Cuisenaire rods, number lines); and
- 3) Discrete models (e.g. counters and sets).

Fraction paper strips are linear models that can be used to teach fractions to pupils in Basic schools. The NCTM (2007) indicated that fraction paper strips are important materials that aid in retention of knowledge and also develop pupils' interest.

Studies by (Cramer & Wyberg, 2009; Moat; 2012) found out that individuals who were exposed to the teaching of fractions using fraction paper strips performed better than those who were exposed to lecture method of teaching. Also, Moat (2012) found out that pupils with negative attitudes towards fractions had their negative attitudes changed positively and also developed confidence in solving problems in fractions using fraction paper strips than pupils under traditional lecture method.

III. METHODOLOGY

Research Design

The design used for this study was an action research. The rationale for using this design was that the study seeks to improve the performance of Basic 5 pupils of Assin Edubiase Methodist primary school in the "addition of fractions of like and unlike denominators" using fraction paper strips.

Sample and Sampling Procedure

The total sample size for the study was thirty (30) pupils comprising sixteen (16) girls and fourteen (14) boys. The ages of the pupils in the class ranged between 9 - 12 years; with an average age of ten (10).

A purposive sampling technique was used to select the pupils in the class because of the difficulties they have in studying fractions. Also, the class was selected because of the willingness of the Basic 5 pupils and the class teacher to participate in the study; and the content under study matches with class teacher's scheme of work at the time of conducting the research.

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Research Instruments

Test and interview were the two (2) instruments used to collect data for the study. Two (2) parallel tests of comparable standards were constructed by the researcher and used for the study. One (1) of the tests known as pre-test was used before the implementation of the intervention while the other test called post-test was used after the implementation of the intervention. Both tests contained ten (10) questions; questions 1-5 were based on “addition of fractions of like denominators” whereas questions 6 – 10 were based on “addition of fractions of unlike denominators”.

An interview guide called Pupil’s Interview Guide was designed and used to collect data from the pupils on the impact of the fraction paper strips intervention implemented in the class.

Data Collection Procedure

Permission was sought from the school authorities to carry out the study in the school. Two (2) weeks were used for the study. The data collection was carried out in three (3) main stages namely pre-intervention stage, intervention stage and post-intervention stage and these stages are described below:

Pre-Intervention Stage

To assess each pupil’s performance in addition of fractions, ten (10) pre-test items were administered to the 30 pupils on the first day. Pupils were given 30 minutes for the test and were supervised by the researcher. After the 30 minutes, the scripts were collected, marked and scored.

Intervention Stage

The intervention stage activities involved the use of fraction paper strips in teaching addition of fractions of like and unlike denominators. In the first week, pupils were assisted to perform “addition of fractions of like denominators” and the activities involved are as follows.

Week One

Objective: By the end of the lesson, pupils’ will be able to add simple fractions of like denominators.

TLMs: Fraction paper strips and fractional chart.

Activity 1:- In this activity, pupils’ were guided to add fractions of like denominators using fraction paper strips as shown below:

Question 1:- Use the fraction paper strips to show that: $\frac{1}{2} + \frac{1}{2} = 1$

Solution to question 1:- The steps involved are;

Step 1:- Pupils were asked to take one (1) of the strips and folded it into two (2), thus taking one-half ($\frac{1}{2}$) of a whole and another half ($\frac{1}{2}$) of a whole giving one (1) whole.

Step 2:- Pupils were guided to cut strips and put together end to end and laid them end to end with one whole of a strip and observed as shown in Figure 1 below.

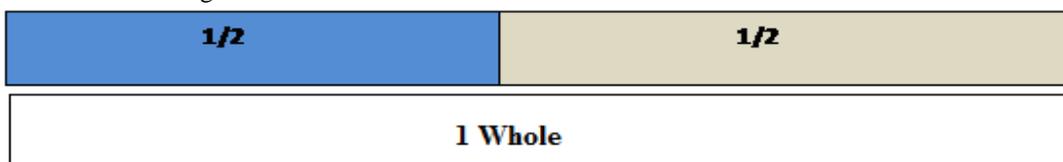


Figure 1: Addition of fractions of like denominators with fraction strips: $\frac{1}{2} + \frac{1}{2} = 1$

Conclusion: It was observed that: $\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$

Activity 2:- Pupils were guided to use the fraction paper strips to solve: $\frac{2}{3} + \frac{1}{3}$

Solution 2:- The steps involved are;

Step 1: Pupils were asked to fold one whole strip into three equal parts and cut out two-thirds and another one-third.

Step 2: Pupils were guided to lay these cut outs end to end on one whole strip and observed as below: (Figure 2)

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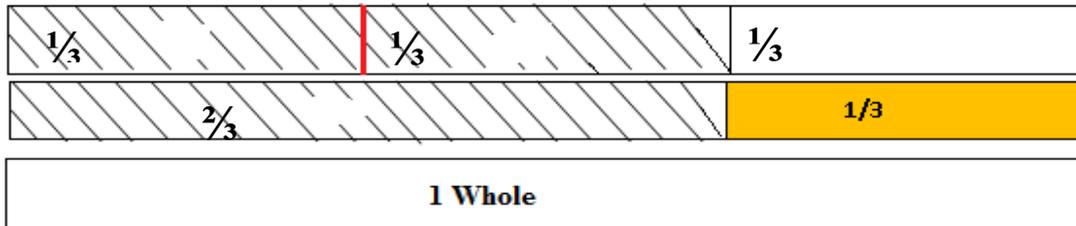


Figure 2: Addition of fractions of like denominators with fraction strips: $\frac{2}{3} + \frac{1}{3} = 1$

Observation: It was observed that $\frac{2}{3} + \frac{1}{3} = \frac{2+1}{3} = \frac{3}{3} = 1$

After these activities, several individual and group exercises on addition of fractions of like denominators were given to the pupils to do in class and as home work; of which most of them were able to do effectively.

Week Two

Objective:- By the end of the lesson, pupils will be able to add simple fractions of unlike denominators.

TLM:- Fraction paper strips.

Introduction:- Pupils were taught addition of fractions of unlike denominators concept through the use of fraction paper strip using the Lesson plan (Appendix D).

Activity 1:- Pupils were guided to use the fraction paper strip to solve: $\frac{1}{3} + \frac{1}{2}$

Solution 1:- The steps involved are;

Step 1: Pupils were asked to fold a whole strip into three equal parts and cut out one-third of it as shown in Figure 3 below:



Figure 3: A fraction paper strip illustrating one-third of a one (1) whole

Another strip of paper of the same length was folded into two equal parts and one-half of it was cut as shown in Figure 4 below:

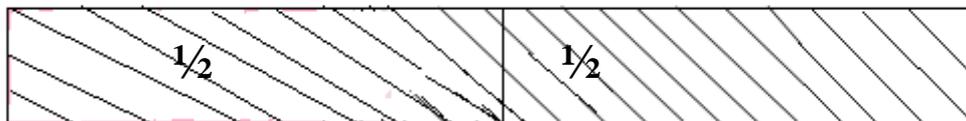


Figure 4: A fraction paper strip illustrating one-half of a one (1) whole

They were then asked to match the two strips of papers and put them together end to end. This is illustrated in Figure 5 as shown below:

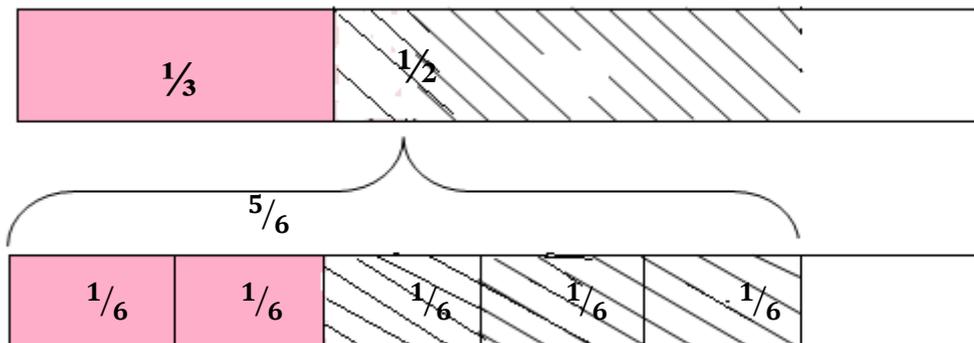


Figure 5: A fraction paper strip illustrating five - sixth of a one (1) whole

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Observation: It was observed that when the one-third strip was laid end to end with one-half on the fractional chart, it matched with the sixths and laid exactly on five-sixth of the whole strip. This implied that $\frac{1}{3} + \frac{1}{2} = \frac{2+3}{6} = \frac{5}{6}$

Activity Two

Question 2: Pupils were guided to find the sum of $\frac{1}{4}$ and $\frac{1}{6}$ using the paper strips.

Solution 2:- The steps involved are;

Step 1: Researcher asked the pupils to cut one-fourth and one-sixth of a whole strip each.

Step 2: Pupils were then asked them to arrange them end to end on the fraction chart.

Step 3: The pupils were further asked to compare and match the formed strips to other divisions on the chart as shown below (Figure 6).

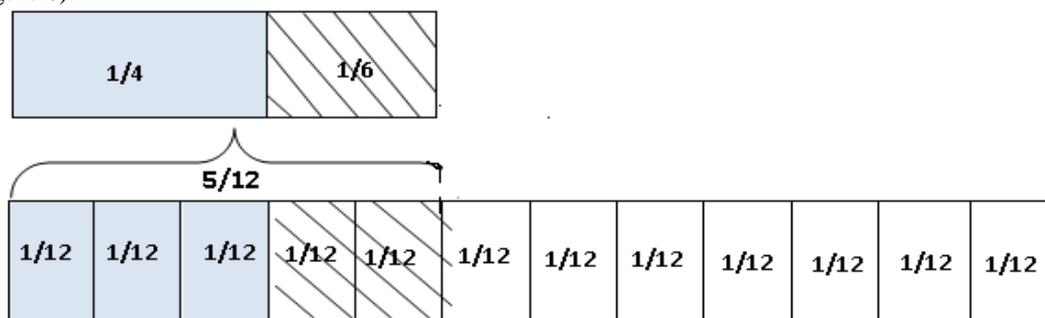


Figure 6: A fraction paper strip illustrating five - twelve of a one (1) whole

Observation: It was observed that both one-fourth and one-sixth strips put together end to end can match the five-twelve strip from the fraction chart. It also implies that these two fractions need a common denominator which is the Lowest Common Multiple (LCM). This shows that $\frac{1}{4} + \frac{1}{6} = \frac{5}{12}$

Pupils were guided to note that when adding fractions of different denominators, first we find equivalent fractions have the same denominators to be added; and after that you proceed in adding fractions of like denominators together as illustrated below.

Sampled Question 1: Add $\frac{1}{4} + \frac{1}{6}$

Solution to Sampled Question 1:-

To add $\frac{1}{4} + \frac{1}{6}$ we find the equivalent fractions of each of them thus,

$$\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16} \quad \text{and} \quad \frac{1}{6} = \frac{2}{12} = \frac{3}{18} = \frac{4}{24}$$

From the above, it can be realized that $\frac{1}{4}$ is equivalent to $\frac{3}{12}$ and $\frac{1}{6}$ is equivalent to $\frac{2}{12}$

Therefore; $\frac{1}{4} + \frac{1}{6} = \frac{3}{12} + \frac{2}{12} = \frac{5}{12}$

Lesson's conclusion:- Researchers summarized the main points on the concept taught and gave pupils some exercises on the concept taught to solve in groups and as individuals.

Post- Intervention

After the implementation of the intervention activities, 30 minutes post-test (Appendix B) was administered to the class. This was done to determine impact of the fraction paper strips in improving pupils' performance in the concept taught. After the 30 minutes, the papers were collected from pupils marked, scored and recorded.

After the post-test, the entire 30 pupils had a face-to-face session in their classroom using PIS. The interview sessions lasted for 3 - 5 minutes for each pupil.

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Data Analysis Method

The study used both quantitative and qualitative data analysis method. The data collected were organized and edited to endure consistency. Data in tests were analysed quantitatively whereas the data from the interview schedule were analysed qualitatively.

Quantitative data analyses were done using descriptive statistics such as frequency and percentages. Qualitative data analysis were done and presented thematically based on the research questions that guided the study.

IV. RESULTS AND DISCUSSION

Analysis of the Results

Tests and interview guide were used to collect data from 30 Basic 5 pupils. The data obtained from these 2 instruments were analyzed and used it to answer the three (3) research questions that guided the study as follows: -

Presentation of Results by the Research Questions

Research Question 1: What are the causes of Basic 5 pupils' inability to perform addition of fractions of like and unlike denominators?

In answering research question 1, pupils' responses to question 1 item in the pupils' interview schedule in Appendix C were analyzed and presented in Table 1.

Table 1: Causes of Pupils' Inability to Perform Addition of Fractions

No	Pupils inability to perform addition of fraction	Frequency	Percentage
1.	Poor methods used in teaching addition of fractions.	30	100
2.	Inappropriate use of TLMs to teach fraction.	29	96.7
3.	Lack of TLMs.	28	93.3
4.	Lack of qualified teachers.	28	93.3
5.	Difficulty of teacher's language.	27	90.0
6.	Lack of required text books.	27	90.0
7.	Lack of motivation.	24	80.0
8.	Large class size.	23	76.7
9.	Lack of parental support.	19	63.3
10.	Absenteeism of teachers.	14	46.7

Source: (From Pupils' interview schedule, 2018)

From the responses in Table 1, it shows that poor methods used in teaching addition of fractions; inappropriate use of TLMs to teach addition of fraction; difficulty of teacher's language; lack of required text books and lack of parental support are some of the causes of Basic 5 pupils' inability to perform addition of fractions of like and unlike denominators. For example, all the 30 pupils representing 100% indicated that poor method used in teaching addition of fractions was the major cause of the problem.

Research Question 2: What strategies do mathematics teachers used to improve the teaching and learning of mathematics in schools?

In responding to research question 2, pupils' answers to question 2 in the pupils' interview schedule in Appendix C were analyzed and are presented on Table 2 below.

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Table 2: Strategies Used to Improve Teaching and Learning of Mathematics.

No.	Items on strategies used by mathematics teachers
1.	Using real objects in teaching.
2.	Using recreational mathematics (puzzles/games).
3.	Using child-centered approach.
4.	Using resource person.
5.	Using motivation techniques.
6.	Practical / activity lesson.
7.	Cooperative learning.
8.	Embarking on field trip.

Source: (From Pupils' interview schedule, 2018)

Data in Table 2 show that using real objects in teaching; using recreational mathematics puzzles/games; adopting cooperative learning; child-centered approach and embarking on fieldtrips are some of the strategies that can be used by mathematics teachers to improve teaching and learning of mathematics in Basic schools.

Research Question 3: To what extent would the use of fraction paper strips improve pupils' performance in addition of fractions of like and unlike denominators?

In answering research question 3, pupils' answers to pre-test and post-test question items in Appendix A and B respectively were analysed, compared and are presented in Table 3 below.

Table 3: Comparison of Pupils' Pre-Test and Post-Test Scores

Pre-Test Scores			Post-Test Scores		
Marks (x)	Frequency	Percentage	Marks (x)	Frequency	Percentage
0	3	10.0	0	0	0.0
1	6	20.0	1	0	0.0
2	8	26.7	2	0	0.0
3	6	20.0	3	2	6.7
4	3	10.0	4	3	10.0
5	2	6.7	5	4	13.3
6	1	3.3	6	3	10.0
7	1	3.3	7	4	13.3
8	0	0.0	8	3	10.0
9	0	0.0	9	6	20.0
10	0	0.0	10	5	16.7
Total	30	100	Total	30	100

Source: (Pupils' pre-test & post-test scores, 2018)

Data in Table 3 above shows that only 4 pupils representing 13.3 % passed the pre-test by having scores above 5 marks; while majority (26 out of 30) pupils representing 86.7 % failed the pre-test by having scores below 5 marks. This is very poor results.

However, as many as 25 pupils representing 83.3% passed the post-test by having scores above 5 marks while only 5 pupils representing 16.7% failed the post-test. This shows an improved performance over the pre-test. The results in Table 3 have been presented in a bar-chart as shown in Figure 7 below: -

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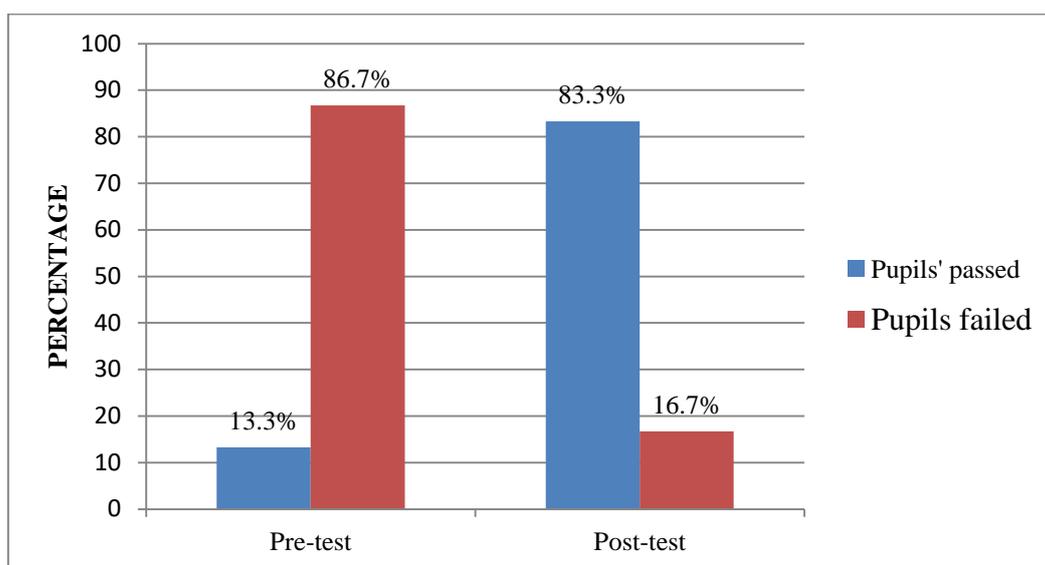


Figure 7: Comparing Pupils' Pre-Test and Post-Test Scores in Percentages

In comparing the pre-test and post-test scores from Figure 7 above, it shows clearly that pupils' performance had improved in the post-test than in pre-test. This improvement in pupils' performance might be attributed to the use of fractional paper strips intervention activities implemented in the school.

In addition, during the interview session, all the 30 pupils agreed that they enjoyed learning fractions with the use of fraction paper strips and that they wanted its continuous use in class in the next lessons.

Discussion of the Results

The study revealed that poor method used in teaching addition of fractions was the major cause of Basic 5 pupils' inability to perform addition of fractions. Other causes identified in the study include inappropriate use of TLMs to teach addition of fraction; lack of required text books and lack of parental support. This finding is in agreement with the result of (Hallahan, 2005; Anamuah-Mensah & Asabere-Ameyaw, 2007; Appiahene et al., 2014) that several factors cause pupils' inability to solve addition of fractions of like and unlike denominators.

It was observed that using real objects in teaching; using recreational mathematics puzzles/games; adopting cooperative learning; child-centered approach and embarking on fieldtrips were some of the strategies used by mathematics teachers to improve teaching and learning of mathematics in Basic schools. This finding is in consistent with the result of (Suydam & Higgins, 1977; Cockrost, 1982; Grouws & Cebulla, 2000) that several strategies could be used by mathematics to improve pupils' performance in mathematics in schools.

It was found out that pupils' performance had improved in the post-test than in the pre-test. This improved performance might be attributed to the use of fraction paper strips intervention activities. This finding is in agreement with the result of (Cramer & Wyberg, 2009; Moat, 2012) that individuals who were exposed to teaching of fractions with fraction paper strips performed better than those who were exposed to lecture method.

Lastly, it was revealed that pupils were very happy learning the concept of fraction with fraction paper strips. This finding is in support with the result of (Moat, 2012) that pupils with negative attitudes towards fractions had positive attitudes and were impressed with the fraction paper strips intervention used than pupils under traditional lecture method of instruction.

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V. CONCLUSIONS

Based on the findings of the study, the following conclusions were drawn:

- 1) It can be concluded that poor method used in teaching addition of fractions was the major cause of Basic 5 pupils' inability to perform addition of fractions. Other causes identified include inappropriate use of TLMs to teach addition of fraction; lack of required text books and lack of parental support.
- 2) It can also be concluded that using real objects in teaching; using recreational mathematics puzzles/games; adopting cooperative learning; child-centered approach and embarking on fieldtrips were some of the strategies used by mathematics teachers to improve teaching of mathematics in Basic schools.
- 3) It can be concluded that pupils' performance in addition of fraction had improved after been exposed to the use of fraction paper strips intervention activities.
- 4) Finally, it can be concluded that pupils were happy with the use of fraction paper strips intervention activities in learning addition of fraction.

VI. RECOMMENDATIONS

Based on the findings and conclusions drawn, it is recommended that: -

1. Mathematics teachers should adopt innovative and effective methods such as the fraction paper strips to enhance teaching of addition of fractions in schools.
2. Government should provide relevant TLMs and also supply required mathematics textbooks to schools so as to improve the teaching of mathematics in schools.
3. Parents should do well to support their wards in schools through provision of resources and also assist them to do their home works or assignments.
4. Teachers should make good use of real objects and other instructional materials that would facilitate the teaching mathematics in Basic schools.

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