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USING THE ABACUS TO ADDRESS CHALLENGES BASIC THREE (3) PUPILS WITH LEARNING DIFFICULTIES HAVE WITH PLACE VALUE OF NUMBERS IN EXPERIMENTAL SCHOOL IN BOLGATANGA MUNICIPALITY, GHANA

Anthony Atandigre Agamboka: *M Phil*[1*], Dominic Kwasi Mensah: *Med*[2*], Ernestina Ador: *Bachelor*[3*]
[1]Special Education Teacher: Department of Special Education, Wilson High School, 1411 E Old Marion Hwy, Florence, South Carolina, USA. atandigreanthony@gmail.com
[2]Mathematics Teacher: Department of Mathematics, Wilson High School, 1411 E Old Marion Hwy, Florence, South Carolina, USA. dominickwasimensah@gmail.com
[3]Department of Early Childhood Education, Jackson College of Education, Bolgatanga Centre, Ghana. adorernestina@gmail.com

Corresponding: atandigreanthony@gmail.com

ABSTRACT

This study adopted the action research design to assist Basic Three (3) pupils with learning difficulties in the Zaare Experimental Primary School of the Bolgatanga Municipality to identify the Place Values of given numbers, using the Abacus. The study was carried out in order to enhance the Pupils' understanding of the concept of place value, the importance of Place Value in learning other concepts in mathematics, and also how the Abacus could be used in teaching Place Value as a concept in mathematics. To achieve this purpose, the study used the Abacus to help improve the pupils' understanding of the concept of Place Value, by engaging the pupils in Pre-Test and Post-Test intervention activities. Purposive as well as census sampling techniques were selected and used as the study was limited to only Basic 3 pupils who had difficulties in identifying the Place Value of given numbers. In all, thirty-five (35) pupils comprising eighteen (18) boys and seventeen (17) girls from the sample groups were used. Three research questions were formulated to guide the study. Pre-test, observation, interview questionnaire, and post-test were the research instruments used to gather reliable data for the study. The pupils were also found to have developed a favorable attitude towards mathematics. Recommendations were made with regard to teachers' and pupils'' attitudes in the teaching of mathematics at the basic school level, and the use of appropriate Teaching and Learning Resources (TLRs) to teach during mathematics lessons to make the lessons interactive.

KEYWORDS

Abacus, Addressing, Challenges, Learning Difficulties, Place Value.

INTRODUCTION

Overview

It has been generally observed that most Ghanaian learners today are faced with difficulties in dealing with mathematical problems in school, especially at the Basic Level. The researchers recent interaction/encounter with Pupils of Zaare Experimental Primary School in the Bolgatanga Municipality, noticed that pupils in Basic 3 had difficulties in identifying the Place Value of given numbers, and as such perform poorly in class exercises and assignments in mathematics. In view of this, the researchers adopted the use of the Abacus to engage the pupils in intervention activities in order to help them overcome the difficulties.

Background to the Study

Mathematics is one of the core subjects which play a crucial role in our daily activities as humans. It is the "life-blood of development, according to Amoah, Bour, Boampong and Arkoh (2019). The further stated that, as a result of mathematics, there is a great gap between the developing and developed countries. This gap is as a result of the greater premium, developed countries placed on mathematics than developing countries which do not regard mathematics as an instrument for development. Amoah, et, al. (2019), again asserted that mathematic all over the world is well accepted as a subject or course that every child throughout the world should study in school. This is because of its application at work places, schools and in our everyday activities. In view of the authors, many children in our Junior High Schools are finding it difficult to understand the fundamental concepts and skills to solve mathematical problems. Many students in at these levels pass their examinations without acquiring the pre-requisite understanding of the most fundamental concepts and principles in finding solutions. However, the poor performance in mathematics by most Ghanaian pupils in our schools today came to light in 1992 when a criterion referenced test (CRT) was conducted for pupils in basic schools throughout the communities in the country which revealed that the pupils' competence in mathematics was very low.

Kwakye, Ofosu, Karim, Zacharia, Zakari, and Asemani (2020) stated that mathematics is compulsory, both at the Basic and Senior High Schools levels, which plays a leading and important role in all aspects of human endeavour. They asserted that mathematics is found in many areas of real-life situations. They mentioned the field of management, business and marketing. The authors maintained that in the history of education, mathematics has held its leading position among all other school subjects because it has been considered as an indispensable tool in the technological fast-growing world.

Again, Kwakye, et, al.(2020) noted that most of the pupils pass their mathematics examinations without acquiring proper pre-requisite understanding of the most fundamental concepts. They asserted that the pupils cannot be blamed alone because the appropriate teaching and learning resources (TLRs) of which both the teachers and the learners need to promote effective and efficient teaching and learning in the classroom and outside the classroom and even homes are non-existence. The concept of place value is essential to help pupils' performances change for the better. This ability of pupils to identify the position of a digit in a numeral is an indispensable fact as far as mathematics is concerned. In effect to this it calls for the attention of many educationists (Anamuah-Mensah & Mireku, 2005) indeed the performance of pupils in mathematics at the senior and junior high levels have become a great concern to all beneficiaries and stakeholders of education.

Asiedu (1998), on the other hand, had earlier proclaimed that the downward trend of performance in mathematics in recent years was a source of worry to not only parents but to all stakeholders of

education and beneficiaries in the country. It was observed that whenever teaching the topic "place value" without using any teaching and learning resources (TLRs), and when evaluation of the lesson was conducted, pupils were not always able to answer the test items that were given to them well. Critical observation revealed that, appropriate TLRs which should be used to enhance the understanding and also to sustain the interest of the pupils in the lesson were not available for use by the pupils. This makes mathematics, which is supposed to be the most exciting subject to pupils, becomes boring and this makes pupils hate mathematics and its activities. Place value, in mathematics, is a set of numbers greater than nine or the position of a digit in numerals. A comprehensive knowledge of place is essential for addition, subtraction, multiplication and division. It is an applicable concept in every level of education to improve in-depth understanding of mathematics. Children need to grasp the concept for them to prove efficiency in any field of their endeavor. In view of the proceeding discussion about the importance of mathematics to the overall development of the individual, the researcher decided to use the appropriate teaching and learning resource (TLR) called "The Abacus" as an intervention to assist or aid the Basic Three (3) Pupils with Learning Difficulties in the Zaare Experimental Primary School, who have difficulties in identifying the Place Value of given numbers, to practically enhance their understanding of the concept to improve upon their performance.

Statement of the Problem

The researcher understudied the Basic Three (3) Pupils of Zaare Experimental Basic School during their visits for various Student-Teacher-Support (STS) activities. Upon careful observation and tests conducted by the researcher during that period revealed that, the pupils were unable to identify the Place Values of given numbers. This results in low performance of the pupils in mathematics. The problem therefore necessitated a thorough investigation into the causes, in order to find remedial measures for them. Hence, this study.

Purpose of the Study

The main purpose of the study was to use an abacus to teach Basic 3 Pupils with Learning Difficulties in the Zaare Experimental School, the concept of place value for them to be able to identify place values. The pupils' ability to identify the place values of given numbers, cannot be achieved without the pupils first knowing what place value is. Also, the purpose is for the pupils to solve problems involving two-and three-digits numbers in mathematics through the use of the Abacus as the instructional materials or Teaching Learning Resource (TLR).Again, the purpose is to identify the effect of using the Abacus in teaching the concept of place value.

Research Questions

To be able to investigate and come out with the appropriate solution, this research seeks to find answers to the following questions:

1. How can the use of the Abacus enable Basic 3 Pupils of Zaare Experimental School, identify the place value of given whole numbers?
2. How will the use of abacus in teaching mathematics sustain the Pupils' interest?
3. What is the effect of using the Abacus to teach the concept of Place Value of given numbers?

Significance of the Study

Children learn effectively when they are given the chance to play and manipulate teaching and learning materials. They learn rapidly when they are placed at the centre of the teaching and learning

process. It is in the light of this that the researcher used the learner centred activities to assist the pupils of Zaare Experimental Basic School to overcome the difficulty in place value. Since Place Value is an important element in mathematics, there is the need for teachers to use the best approach to help the pupils understand the concept. Therefore, the outcome of this research will be of benefit to the Basic Three (3) Pupils with learning difficulties in Zaare Experimental Primary School, as their understanding will be enhanced. The study will also benefit the teachers in the school as to how to select an appropriate instructional material when teaching challenging concepts in mathematics. Also, it will be of importance to other teachers in different schools who might have been facing similar problems in their teaching. Again, it will be of essence to the Ghana Education Service on how to select and provide teaching and learning resources for schools. Finally, the outcome of this research will enable pupils or learners to have vast knowledge and understanding about instructional materials to enhance their performance when any mathematical task is given to them in class.

Delimitations

This research is focused on the use of the Abacus as a teaching and learning resource (TLR) to address the challenges that Basic3 Pupils with Learning Difficulties in Zaare Experimental Primary School have with the identification of Place Value of given numbers. Therefore, the study is delimited to only the thirty-five (35) students in Basic 3 Class of the Zaare Experimental Basic School in the Bolgatanga Municipality of the Upper East Region of Ghana.

Limitations

This project is conducted at Zaare Experimental Basic School with thirty-five Class Three (3) Pupils who have difficulties identifying the Place Value of given numbers as the population of the study. The study would have covered the whole Municipality Primary Pupils, but due to limited time, and resources constraint, the researcher delimited the study to only the Basic Three (3) Pupils of the Zaare Experimental School. Therefore, the results of the study cannot be generalized.

LITERATURE REVIEW

Overview

This chapter deals with the review of related literature which consists of written materials and opinions of experts in the field understudy. It has delved into the concept of mathematics and its importance, how the pupils' knowledge of the concept of Place Value is important. It also discussed the Abacus and its importance, as well as methods of teaching mathematics using the Abacus, and the effects it has on enhancing pupils' understanding of the place value concept.

Mathematics is foundational in many ways that informs our decisions in areas of our lives. Teaching and learning materials are at the heart of education life, they provide skill acquisition, and as well prepare students for the workforce, and also foster mathematical thinking (Ontario Ministry of Education, 2005). Mathematics involves learning to solve problems, investigate, represent and communicate mathematical concepts and ideas and making connections to everyday life (Ontaro Ministry of Education, 2005). Given the importance of mathematics, the review of following concepts, obtaining knowledge from the review about them can help create effective classroom practices for supporting pupils‟ development in mathematic:

The Concept of Place Value

During the researcher's time as a teacher the researcher noticed how some Basic3 pupils of Zaare Experimental Primary School struggle with place value concepts. Place value is an important number at basic seven. It is important because a secure knowledge of place value equips children to solve problems with number operation. Place value is the value of a digit in numerals. Bigg and Button (1983) stated that the topic "place value" is the use of ten symbols in different positions to represent many values. Place value is one of the most difficult of the base number concepts for children to understand. For concepts, the number seventy –six (76), the value of the number symbol on the right-hand side is 6 units and the number on the left-hand side is 7 x 10 in 70 units. Mishioo, (2007), the concept of place value is the ability to group objects into sets of equal size and then further collect them together into sets of sets. He also said that, the position of a digit in a number gives a characteristic behaviour different from the same digit in different numerals for instance, 7466 and 4667, the digit 4 in 7466 is 400 but in 4667 the digit is 4000. This means that the same digit "4" represents different values in 7466 and 4667.

Adjei (2006), children are able to work with whole numbers greater than nine; they must understand the concept of place value. He defined place value as the position of a digit in a numeral. The concept of place value is applied when we follow the idea that the position of each digit in a numeral determines its value in the numeral. For instance, the position of the digits in the numeral 32754 is given as:

Digits:	3	2	7	5	4
Place value:	Tens of Thousands	Thousand	Hundred	Ten	Ones

It can be deduced that any number greater than nine has its value and value is different from the position of a digit in the numeral. Paling (1982) advocated the above explanation when he stated apparently that the value shown by a digit depends on its pace in a numeral. He cited an example as, the right hand 2 in 122 represents 20nes, but middle 2 represents 2 tens and 1 represents 1 hundred. This means that the children cannot comprehend the full algorithms of addition, subtraction, multiplication and division if they are not able to identify the value of a digit in a numeral. Zaltan (1969) indicates that we use the place at which we write numbers to identify what kind of numbers we are thinking about. For instance, when we write 1453, that is one thousand, four hundred and fifty-three.

What this means here is that we have one lot of thousand, four lots of hundreds, five lots of tens and three more objects after that. The notion is that a given numeral can be grouped into tens and ones. After that the rest of the tens will be grouped separately and the remaining will be countered as units or one. Thus, 1453 will be 1 tens of ten of ten, 4 tens of ten 5 tens and 3 units. In order to scotch the misconception that mathematics is a difficult subject, teachers of the subject need to employ the use of concrete materials in teaching every concept of the discipline. Adjei (2006) is of the view that appropriate use of teaching and learning materials makes the teachers" lessons practical and real. He went on to say that teaching and learning materials save time because fewer words are used to explain a concept. The researchers agree on this statement because mathematics lessons are supposed to be taught practically so that pupils can derive solutions to the problem themselves. Adjei (2006), again advocated the use of teaching and learning materials in teaching when he stated that teaching and learning materials make pupils active and increase pupils' participation in lessons. The practicality of mathematics and other related subjects reflect when the needed teaching and learning materials are used. Obviously, a child needs a clear and full understanding of place value as an essential element or

tool in order to progress in addition, subtraction, multiplication and division. Young Loveridge (2001) notes that there are two broad concepts of numbers that are the basis children understand when adding or subtracting multi-digit numbers. The place value ideas have been very essential in children's education. Many develop mentalist have proposed those ideas to be prudent at the early stages of the children's development in the concept of place value. It is obvious because it deals with concrete materials and many experiences.

Importance of Place Value

- Each of the algorithms for whole numbers computation is based on place value ideas
- Children need to have a form comprehension of those ideas before they can work effectively with multiplication algorithms
- Linking idea directly with renaming ideas is a necessary step as the algorithm for each operation is developed
- Providing numerous trading activities are accompanied by renaming activities.

The Concept of Abacus

Abacus is an ancient calculating device used primarily in Asian culture for performing arithmetic processes. Abacus devices consist of a wooden or plastic frame with beads sliding on wires (Heffeifinger& Gray, 2004). The word abacus dates before 138AD in Greek "abax" or "abacon" means table or tablet. In India, first century sources AbidharmaKosa, describes the knowledge and the use of abacus by Indian clerks. Even today abacus is used by Shopkeeper, merchants I Asia and China towns in North America presently taught in Asia including India in Preschool and Elementary school as an aid in teaching arithmetic (Jakashi, www.akula.com). Memory is an act of an immense process of physiological activities at every act of memorization or information processing approach. The information processing approach divides memory into three general stages; sensory memory, short term memory, long term memory (Baddeley, 2011). Today in India, using abacus is an external agent extensively practiced to teach learners mathematics for children.

Studies have shown that abacus not only computes mathematics calculation, but also develops memory consistently (Bhaskaran, Sengothlyan, Madhy, Ranganhtan, 2006). There may arise a question in one's mind that why is there a need to teach children to use abacus or to teach them solving arithmetic problems using abacus in this time of advanced technology. But the fact is that, even if the advancements are made in technology making it possible for human beings to perform complex calculations and to explore new dimensions in the field of knowledge, the mind of the child is completely empty and it is to be written on. Childs mind could grapes something with difficulty and has the tendency of forgetting learnt topic after some time. (www.abacus lesson.com). With the help of abacus simple arithmetical functions are easy to learn especially multiplication which may seem easier to an adult to perform but are very difficult for the juvenile to understand (www.abacus lesson.com). Sometimes it is needed to teach children how to use an abacus. For instance, blind children are taught to use abacus because they cannot perform calculations on paper. Abacus has proved out to be an ideal too for those people as it allows them toc calculate easily and quickly while being reliable. The use of abacus is easy to understand for the new beginner and it also helps in developing the mind of the children (www.abacus lessons.com).

Importance of Abacus

Amoah, et, al. (2019) explained that the abacus was invented by Charles Babbage though it is now being used by the entire world to turn on the mental abilities of young brains. The authors stated that

abacus training sharpens our memory and increases our ability to perform mental calculations. Abacus was designed in such a manner so that the brain visualizes the abacus while performing calculations which automatically activates the right part of our brain especially when we move our fingers over the beads and talk louder while solving the problem. However, one needs to enjoy the abacus education training process only then will one be able to truly benefit from the technique. The energy and abilities of our mind are not limited. It is the master organ which takes all the decisions of the body. The left brain is also known as the digital brain whereas the right brain helps in creative pursuits. Both sides of our brain need to work in sync with each other and that is where abacus training helps us. Amoah, et, al. (2019) further stated in their explanation, that abacus training has become increasingly popular in India of late and helps the young minds understand the great number plan on which the universe is being run. Abacus calculation method helps in learning number manipulation skills, decimal grasp and digit correlation among other skills. While electronic calculations need numbers as inputs, in abacus education, children learn to convert the beads into numbers and thus arrive at a result. The chain just goes on, the abacus sharpens the brains and the brain thus gains more expertise in solving mathematics problems using abacus.

In summary, it can be said that mathematics creates a supportive and engaging classroom environment, providing a strong mathematics foundation, being knowledgeable about mathematics and also place value means the value of a digit in numeral. A sound knowledge of place value helps pupils to perform the four basic operations in mathematics, thus addition, subtraction, multiplication and division (Amoah, et, al., 2019).

The Methods of Teaching Mathematics, Using the Abacus and Its Effects

Mathematics teachers should be abreast with the terminologies, symbols, signs so as to enhance efficient tuition of the subject at all levels and in all spheres of life. With regards to Ansubel, Meyer and Yung (2003), it is appropriate to note that the most important single factor influencing learning is what the learners already know. Therefore, it is essential for teachers to ascertain this and teach pupils at all stages accordingly. Admittedly, it is clear that a pupil's relevant previous knowledge should be traced before any meaningful teaching and learning can take place.

In addition, Davidson (2001) expressed that schools could be built, adequate textbooks can be provided but if pupils are not given proper tuition and skills, then, we should be counting numbers backwards on the progress chart. Teachers are to make good use of teaching and learning materials to arouse pupils' curiosity to work on any given activity until he or she is satisfied with the outcome or results.

Habbard (2000) and the great psychologist Jerome Brunner (1995) advocated for the question method of teaching mathematics. They observed that it is easier for people to fall asleep while reading or listening rather than speaking or writing. This may be one reason why pupils are more responsive and more actively involved in the classroom when they are made to examine the content of the lesson more closely by the use of questions. Students' answers to questions also enable the teachers to judge their level of understanding and to assess their progress.

Biggs (2000) also stated that, "the choice of a teaching method depends on so many factors such as the level of the class, the ability of the pupils, the nature of the mathematics topic and the facilities available in the school". She suggested that teachers should divide the class into groups of five or six

of about the same ability and teach them in groups. This procedure will enable the teacher to attend to the weak groups and also give the more able groups more challenging tasks.

Another significant epistemological view of this study is that tools or materials may produce mathematics concepts (Borba& Villarreal, 2005). This notion is based on the idea that mathematics concepts are not an individual enterprise, and tools or materials which are essential elements of mathematics concepts (Villarreal &Borba, 2005).

The process of developing specific teaching techniques (Kidwell, Ackerberg-Hasting & Roberts, 2008). Thus, diverse tools and materials might be related to various mathematics concepts and concrete materials in the past are useful to reveal how mathematics concepts have developed overtime. Revealing the past that lies behind Bundle of sticks and Abacus may help us understand how to reflect on a wide range of discussion about teaching numerical concepts to students. The preliterate notation of numbers by rope concept of one-to-one corresponding, but also describe the concept of equal increment in increasing amount according to the numbers (Roberts, 2001). Unlike the current number system, which uses ten different symbols for each digit (0 to 9), "quipu" manufactures tangled several knots in a tight sequence to represent a digit.

Summary of the Literature Review

The literature reviewed looked into the following thematic areas, the concept of mathematics and its importance, how the pupils' knowledge of the concept of Place Value is important, as well as the Abacus and its importance, and the methods of using the Abacus to teach mathematics, and its effects in enhancing pupils' understanding. In summary, it was revealed in the literature review that mathematics creates a supportive and engaging classroom environment. Therefore, providing a strong mathematics foundation, and also being knowledgeable about mathematics and also place value which is the value of a digit in numeral, gives pupils a sound knowledge to perform the four basic operations in mathematics, thus addition, subtraction, multiplication and division.

METHODOLOGY

Overview

Chapter three discusses the methods used for the study. It entails the research design, population, sample and sampling technique, instruments used for the data collection, Pre-Tests, and Post Tests Interventions activities, as well as the data collection procedure and data plan.

Research Design

Research design describes the basic design used in the study and its application to the study. It refers to the researcher's overall plan for obtaining answers to the research questions. The research design used for the study was the action research which is a type of design used to solve classroom problems scientifically. Also, action research is undertaken to improve upon certain practices, Adzantu (2008). This is conducted by the practitioner with such pending issues or problems. This practitioner could be the teacher, supervisor or the headmaster or mistress. Johnson (2008), also stated that action research is the process of studying a real school or classroom situation in order to understand and improve the quality of actions or instructions. Johnson (2008) added that, action research is also a type of inquiry that is pre-planned, organized, and can be shared with others. It is normally conducted in a local setting. The researcher therefore in an attempt to find an immediate solution to the problem, resorted to the use of action research design. This action research was used to investigate critically into pupils' poor performance in mathematics and specifically in addition to two- and three-digit numbers.

Koshy, (2010) on the other hand pronounces action research as: a constructive investigation, through which the researcher constructs their knowledge of specific issues through planning, acting, evaluating, refining and learning from those experiences. It is a continuous learning process in which the researcher learns and also shares the newly generated knowledge with those who may benefit from it.

Inferring from Koshy (2010) pronouncement, it is possible to say that action research can be viewed at as a professional knowledge, suitable for any person who wishes to improve their performance or any group or organization who hopes for doing the same. As a matter of fact, action research is widely used in education, especially by teachers who use it to improve their teaching although it has some shortcomings.

Population of the Study

The target population was Basic three (3) pupils with learning difficulties of Zaare Experimental Primary School. It consisted of thirty-five (35) pupils comprising eighteen (18) boys and seventeen (17) girls. This school was chosen because the researchers were assigned to this class for the Student-Teacher-Support (STS) programme activities in the school.

Table 1. The students' population is tabulated below:

Table 1: *Population of the Study*

Sex	Number of Pupils	Percentage
Boys	18	51
Girls	17	49
Total	35	100

Sample and Sampling Technique

An individual inventory evaluation test that was conducted revealed that all the thirty-five (35) pupils had difficulty identifying the place values of some given numbers. All of them scored below 50% of the total marks from the pretest activities were given to them. The intention here was to determine their level as well as specific skills in which they are deficient at. The pupils could not do simple identification of the place values of some given numbers within two-digits to four-digits numbers range, which were provided as samples for the project work. The sampling technique for the study was purposive sampling technique. This is because the problem identified was based on pupils' written exercises, visual observation and test on the identification of the Place Values of two-digits to four-digit numbers.

Research Instrument

The researcher used observation and evaluation test as the main instruments to gather the relevant information for the study.

Observation

Researchers are said to be observing, when they collect data on the current status of the subjects by watching, listening and recording what is being done by the target group. Observation was done during a mathematics lessons, and realized that most of the pupils were finding it difficult to identify the Place Value of given numbers. Hence the adoption of the use of the Abacus as an instructional

material or teaching learning Resource (TLR) to assist the pupils to overcome this challenge. The purpose of the observation instrument helped the researchers at the intervention stage to determine the problem among the pupils. It also helped the researcher at the intervention stage to find out how the pupils could use and apply the knowledge gained after the explanation and illustrations using the Abacus. Again, it facilitated at the post intervention or test to find out whether the intervention technique had any influence on pupils' approach to identifying the Place Values of given numbers.

Evaluation Test

A test was conducted on Basic Three (3) Pupils of Zaare Experimental Basic School to know the pupils' understanding level of Place Values of numbers with the use of the Abacus to solve such problems.

Pre-Test

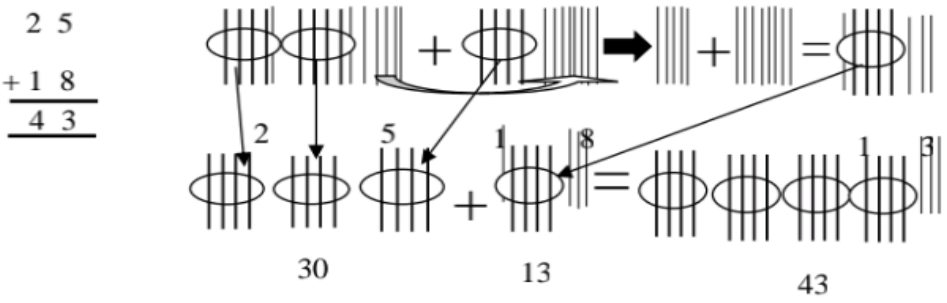
The Pre-Tests were conducted to diagnose the level of pupils' ability to add given numbers and identify their Place Values. This was done by giving pupils a written test and oral exercise. From the result of the Pre-Test the researcher put the following interventions in place. See Appendices. Five questions were given to the pupils to be answered within twenty minutes in all cases. Pre-Test was first (Pre-Test I) done for the pupils in the class, of which all of them were sampled for this study.

Intervention

Intervention is a set of strategies planned and implemented to solve a specific problem or improve on an educational practice located in an immediate situation. The main intervention used was the use of Abacus as the appropriate teaching learning resource or instructional materials under which the following activity was carried out: to develop the place value concept of given numbers.

Activity one (1)

The use of Bundles of stick to teach addition of two-digit numbers. In the first week, the researcher introduced pupils to the use of Bundles of stick and "loose ones" to enable them develop the skill of obtaining the sums of two- and three-digit numbers. For example, to sum up 25 and 18, researchers assisted pupils to collect two bundles of sticks and 5 loose ones to represent 25 and pick one bundle and 8 loose ones to represent 18. Then they first put the loose ones together and put the bundles also together to get the sum. Pupils were also guided with explanations to tell the values of each digit of their sums. Since the loose ones are13 and each bundle represents ten (10), they added to get 4 bundles and 3 loose ones as illustrated below:

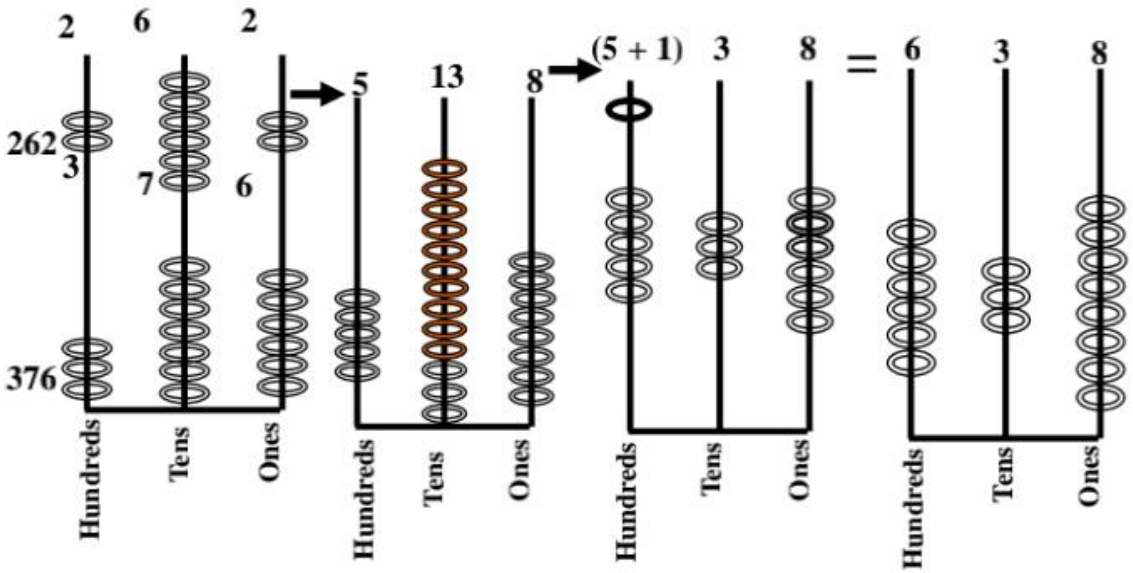


Activity two (2)

The Use of Abacus to Teach Place Value of Some Given Numbers

At the intervention stage, different types of activities were carried out, using the Abacus, so as to make the lesson more practical and activity based to the learners. Example, using the Abacus to solve addition problem 376 + 262, six beads were put on the ones' column, seven beads were put on the tens column and three beads were put on the hundredth column for 376. The same was done for the numeral 262 where two beads were put on the ones' column, six beads were put on the tens column and two beads were put on the hundredth column on the same Abacus. The addition then started from the right end; 6 ones added to 2 ones gave 8 ones. On the tens column were 7 tens added to 6 tens which gave us 13 under the tens' column. With the hundredth column, 3 was added to 2 to give us 5 under the hundredth column. We had 8 on the ones' column, 13 on the tens' column and 5 on the hundredth column. From the tens' column, 1 (which is actually a hundred) was taken from the 13 and carried on to the hundredth column, thus making the hundredth column 6. It was therefore concluded that 376 added to 262 gives 638, mathematically 376 + 262 = 638.Pupils were engaged in series of similar activities, and were as well tasked to identify the place values of the digits that make up the sums of their answers.

Fig 1. *Abacus for Identifying Place Value of Numbers*



Post-Test

After the intervention, a Post-Test was conducted for the pupils to use the Abacus to solve some five questions within the same twenty (20) minutes as used in the Pretest. This was to see whether the interventions put in place had any positive effect on the pupil's performances. Questions were selected from Pupil's Mathematics Book 3. They were given about twenty minutes to solve the five-item problems. Pupils work were marked and scored accordingly. See Appendix 3.

Data collection Process

Non-Participant observation and tests to collect data for the problem were the instruments used. The researcher observed the pupils during mathematics lessons and saw that the pupils were finding it difficult to solve addition problems and identify the place value of given numbers during class exercises. The researcher again selected some simple addition involving place value questions from

Pupil's Mathematics Textbook 3 to determine the extent of the problem. Written test for both the Pre-Test and Post-Test were conducted at various levels of the intervention process. The Abacus was used as the intervention strategy to address the pupils' problem.

Data Analysis plan

The researcher used frequency tables, charts, figures and percentages in analyzing the data of the study.

RESULTS, FINDINGS AND DISCUSSIONS

RESULTS

Pre-Test I

The following data was collected for the Pre-Test I (for the thirty-five (35) pupils). The researcher analyzed the outcome of the observation exercise undertaken at the beginning of the study. The researcher observed the pupil's performance in additions of two- and three-digit numbers and the place values of the sums of the numbers, when marking pupils class exercise and assignments. The researcher placed emphasis on the positions of numbers and the final answers provided and scored them out of ten (10) using simple percentages. The researcher analyzed the finding in the table below.

***Table 2**: Pupils Pre-Test I Results*

No of Pupils	Scores Range	Percentages (%)	Remarks
23	0-2	65.7	Lowest
10	3-4	28.6	Low Average
2	4.5-5	5.7	Little Above Low Average
0	5-7	0	Average
0	8-10	0	Above Average
35	**10**	**100**	**Total**

From Table 2, the researcher gave out five (5) questions to the pupils which were marked over ten (10). Out of the ten (10) marks, twenty-three (23) pupils scored 0-2 marks representing 65.7% and had the lowest mark. Ten (10) pupils also scored 3-4 marks out of the total of ten (10) representing 28.6% which is low Average mark. Two (2) scored from 4.5-5 marks representing 5.7%. In all, no pupil obtained an average mark during the pre-test. The researcher purposively conducted the actual Pre-Test (Pre-Test II) for all the thirty-five (35) pupils. The table below gives the detail representation of the results.

Pre-Test II

Table 3: result of the Pre-Test (Pre-Test II) Addition of two- and three-digit numbers After the researcher had used test and observation to obtain information on pupils' possible cause of their inability to add two- and three-digits numbers and identify the place values of the sums of those additions. He further tested pupils to determine the extent of the problem. From the result in this test, Pre-Test II was analyzed in simple percentages in the table below.

***Table 3:** Pupils' Pre-Test II Results*

No of Pupils	Scores Range	Percentages (%)	Remarks
13	0-2	37	Lowest
21	3-4	60.0	Low Average
1	4.5-5	3	Little Above Low Average
0	5-7	0	Average

0	8-10	0	Above Average
35	**10**	**100**	**Total**

The table above shows the results of the Pre-Test II conducted at the beginning of the study. It could be seen that only one (1) pupil scored the Little Above Low Average mark of 4-5 or 5 which is 3% with twenty-one (21) pupils representing 60% scoring between 3 and 4 marks which is Low Average Performance. Also, thirteen (13) pupils representing 37% scored between 0-2marks which is the Lowest performance. And no pupil scored 5-7 and 8-10 marks, which are Average and Above Average respectively. All the pupils sored below the average marks; an indication that their performance in mathematics in the area of place value was very poor.

Post-Test I

Table 4: result of the Post-Test I on Addition of two- and three-digit numbers using either the Abacus. After the Pre-Test results, which indicated the poor performance of the pupils' inability to add two- and three-digit numbers and identify the place values of their sums correctly, the researcher adopted an intervention approach which is the use of the abacus to help minimize the problem. After the interventions, the researcher conducted another test on pupils to find out if there has been an improvement and the results was collected and presented on a table below.

***Table 4**: Pupils' Results from the Post-Test*

No of Pupils	Scores Range	Percentages (%)	Remarks
0	0-2	0	Lowest
0	3-4	0	Low Average
0	4.5-5	0	Little Above Average
8	5-7	23	Average
27	8-10	77	Above Average
35	**10**	**100**	**Total**

The table three (4) above provides the results of the Post-Test I conducted after the intervention. It could be seen that none of the pupils scored between 0-2, and 3-4 marks, or even the Little Above Low Average range. Eight (8) pupil scored average marks between 5 and 7 which is 23% and twenty-seven (27) pupils representing 77% scored between 8 and 10 marks which is above average performance. In general, all the pupils scored the average marks and above. The result from the Post-Test I show clearly that there has been a great improvement in pupils' performance in mathematics after the intervention.

Findings

From the discussion of the data presented on table two (2) to four (4), if pupils have had enough time to practice on how to use the abacus carry out activities on the Place Value Concept, and other mathematical operations, where they have been assisted, supervised and motivated, the concept and mathematics would become easier and more understandable to them.

Again, it is obvious from the results obtained that through demonstrations, practical activities, games and motivations, pupils can always excel in mathematics, and these strategies are no doubt the best and most convenient approaches for beginners. Thus, through various activities like the use of the Abacus to teach, therefore making mathematic lesson more stimulating and interesting.

Again, the results from all the evaluation exercises clearly showed that the activities designed for this study have really helped pupils to overcome their inability to identify the place values of given

numbers. The differences of performance as in the Pre-Test II and Post-Test I with references to the number of pupils who scored lowest, below average, average and above average marks is an indication of improvement as can be seen in the Post-Test I. The performance of the pupils can now be inferred that the vast differences of their performance in the Post-Test I was brought about as a result of the intervention measure employed by the researcher.

Table 5: *Comparison Pre-Test II and Post-Test I*

Marks (10)	Pre-Test	Pre-Test Percentage	Post-Test	Post-Test Percentages
0-2	13	37	0	0
3-4	21	60.0	0	0
5-7	1	3	8	23
8-10	0	0	27	77

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary of the Findings

The study findings revealed that the Abacus is an effective Teaching and Learning Resource (TLR) in reinforcing the acquisition of knowledge of the concept of Place Value. The Basic Three (3) Zaare Experimental Basic School who have mathematics learning difficulties that were taking through the use of Abacus and during mathematics lessons had all the pupils attempting the test administered to them. This shows that the use of the Abacus has reinforced the pupils' acquisition of Place Value Concept skills. The study found that the schools do not have enough teaching and learning materials to be used in teaching and learning mathematics concepts especially the Concept of Place Value. The study also discovered that the pupils performed well when the used the Abacus to do the exercise given to them. Using the Abacus also promote the acquisition of knowledge in other mathematical skills and concepts. The adoption of this approach by the researchers enhanced the pupils' skills, knowledge and better understanding of the Concept Place Value. Outwardly, since all the pupils performed creditably, the researchers firmly concluded that the purpose to of the study which was to assist Basic Three (3) pupils with learning difficulties in Zaare Experimental Primary School in the Bolgatanga Municipality to identify the Place Value of given numbers was achieved.

Conclusion

The study which sought to use the abacus to address the challenges Basic 3 pupils with learning difficulties have with Place Value of given numbers was conducted at the Zaare Experimental Primary School in the Bolgatanga Municipality of the Upper East Region of Ghana. The study tried to intervene by instituting strategies through various activity organized to arrive at improving the pupils' knowledge in Place Value. The researchers are of the firm conviction that the study was worth the time and resources spent on it and it was timely too.

Recommendations

The following recommendations were made as the result of the outcome of the study:

- Sufficient and appropriate teaching learning resources (TLRs) should be used by teachers or educators to stimulate pupils to actively participate and develop keen interest in place value concept and mathematics as a whole. The Ghana Education Service (GES) should organize a regular in-service training for teachers on the concept place value especially at the Basic Level, to frequently update teachers' knowledge on how to teach challenging concepts.
- Teachers having similar problems could adopt the use of the Abacus, Multi-Base Block as methods to solve their problems.
- Teachers should place more emphasis on hands-on concepts or activities on the teaching of challenges concepts like the Concept of Place Value, so that the pupils can grasp the concept with ease as children learn best by doing and active participation.

Suggestion for Further Research

The following suggestions are made for consideration in future research:

1. Using Multi-Base Blocks to address Basic School Pupils with learning difficulties' challenges on identifying Place Values of given numbers.
2. Using Cuisenaire Rods to address challenges Basic School Pupils learning difficulties' have on solving Equivalent Fractions.

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APPENDICES

APPENDIX 1

PRE-TEST I

Solve the following question by adding living your answers in hundreds, tens and ones

1.
$$\begin{array}{r} 2\ 7\ 6 \\ +\ 4\ 3 \\ \hline \\ \hline \end{array}$$

2.
$$\begin{array}{r} 4\ 5\ 2 \\ +\ 4\ 7 \\ \hline \\ \hline \end{array}$$

3.
$$\begin{array}{r} 2\ 9\ 1 \\ +\ 7\ 2 \\ \hline \\ \hline \end{array}$$

4.
$$\begin{array}{r} 8\ 3\ 2 \\ +\ 1\ 3 \\ \hline \\ \hline \end{array}$$

5.
$$\begin{array}{r} 7\ 5\ 3 \\ +\ 1\ 6 \\ \hline \\ \hline \end{array}$$

APPENDIX 2

PRE-TEST II

Solve the following question by adding living your answers in hundreds, tens and ones

1. 734 + 53 =

2. 546 + 81 =

3. 627 + 155 =

4. 274 + 152 =

5. 218 + 255 =

APPENDIX 3

POST-TEST I

Using the Abacus, regroup and solve the following question and write your answers in hundreds, tens and ones.

1. 356 + 20 =

2. 394 + 32 =

3. 466 + 14 =

4. 157 + 85 =

5. 781 + 33 =