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Effects of Outdoor Mathematics on the Enthusiasm, Attitude and Achievement of Grade Six Pupils

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**EFFECTS OF OUTDOOR MATHEMATICS ON THE ENTHUSIASM,
ATTITUDE AND ACHIEVEMENT OF GRADE SIX PUPILS**

A Seminar Paper
Submitted to the Faculty of the
College of Graduate Studies and Teacher Education Research
Philippine Normal University
Taft Avenue, Manila

In Partial Fulfilment
of the Requirements for the Degree
Master of Arts in Teaching Mathematics

NIMROD V. FERNANDEZ
March 2016

APPROVAL SHEET

This seminar paper entitled **“EFFECTS OF OUTDOOR MATHEMATICS ON THE ENTHUSIASM, ATTITUDE AND ACHIEVEMENT OF GRADE SIX PUPILS”** prepared and submitted by **NIMROD V. FERNANDEZ** in partial fulfilment of the requirements for the degree of Master of Arts in Teaching Mathematics is hereby recommended for approval and acceptance.

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Above all, to Almighty God, the provider and source of all enlightenment, wisdom, power and anything I need.

N.V.F

DEDICATION

This humble work is heartedly dedicated

to my parents

Jorge and Elizabeth Fernandez

my brother **Hero** and sister **and Abigail**

and my friends

for their loving gesture of understanding, patience, moral support that inspired

the researcher to finish his study.

More so to

Our

ALMIGHTY GOD

The core, the meaning, and strength

of all my endeavors

ABSTRACT

Researcher	: NIMROD V. FERNANDEZ
Title	: The Effects of Outdoor Mathematics on the Enthusiasm, Attitude and Achievements of Grade Six Pupils
Key Concepts	: Outdoor Mathematics Enthusiasm towards Mathematics Attitude towards Mathematics Mathematics Achievement
Degree	: Master of Arts in Teaching
Specialization	: Mathematics
Adviser	: Elisa S. Baccay, Ed.D.

This study investigated the effects of outdoor mathematics on the enthusiasm, attitude and mathematics achievement of Grade Six pupils. The study involved grade six students of Jose Zavalla Memorial Elementary School in the City of Santa Rosa Laguna for school year 2015-2016. The study used the experimental design specifically the pre-test-post-test control group design. It involved 35 students in the experimental group and another 35 students in the control group randomly chosen from intact groups selected by

the lottery method. The research instruments used were the Enthusiasm Scale (Appendix I), Attitude Scale (Appendix H) and Mathematics Achievement Test (Appendix G). The t-test for dependent and independent samples were run on the data gathered to determine the significant difference in the pretest and posttest mean scores of the respondents in the three instruments used. Findings reveal that posttest mean scores of the experimental and control group are significantly different in terms of enthusiasm and attitude, while there is no significant difference in terms of mathematics achievement. The results show that outdoor mathematics help the learner develop positive attitude and enthusiasm towards mathematics. However, outdoor mathematics has no significant effect on students' mathematics achievement.

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Chapter 1

THE PROBLEM AND ITS BACKGROUND

Introduction

Learning mathematics is a human activity which arises from experience and becomes an integral part of culture and society of everyday life and work (Ferrer 1990). It should be learned not only for its utilitarian importance but also for developing the cognitive aspect of an individual.

Justo (1999) believed that mathematics plays a vital role in the lives of individuals. He stressed that everyone must acquire competence and develops the power of quantitative thinking. Despite the importance attached to mathematics learning, many students take the course for granted. The quality of mathematics education is very alarming (Duque 1999). The dismal performance of Filipino students in mathematics in international assessment in mathematics reveals how they sorely lack in the subject. Results of local assessment confirm this poor performance. In the National Achievement Test (NAT) held from 2013 to 2015, the achievement of the students in mathematics was low. Majority of the examinee obtained below average scores in mathematics. For the past three years, the result of the NAT for the Grade Six pupils of Jose Zavalla Memorial Elementary School revealed that majority of the students obtained below average

ratings specifically in Mathematics which means they are not performing well as expected.

Mathematics elicits various reactions from different people. Most students hate it and a rare few consider it to be their best subject (Lee-Chua 2002). Others regard its importance to the learners, Cabatay (2011) said that mathematics is learned for three reasons: First, for functional literacy; Second, as tools for communication and Third, to develop critical thinking and problem solving. Indeed, mathematics skills are necessary to make people more equipped in solving various kinds of problems they encounter every day. The mastery of the basic mathematical skills is needed to cope with the demand of living. Such demands include being numerically literate to gain tools for future employment, developing the necessary skills in preparation for further education and appreciating relationship between mathematics and technology. Mathematics is regarded as the language of science and many disciplines depend on this subject as a means to analyze empirical data and systematically communicate ideas and processes. Moreover, mathematics education plays an important part in developing students' decision making and problem solving skills. Very often, students do not see and appreciate what the school is doing for them.

The reason why some students feel disconnected in school is because they are consistently overlooked. They are seldom encouraged to participate in activities and they have poor interpersonal relationship with their teachers. Many

teachers do not empathize with their students; they lack the necessary caring attitude enough to engage them to participate in school life (Purkey and Novak 1996). The teacher as a classroom manager makes a lot of decisions. He decides on the teaching techniques to be employed every day to maximize learning. Hence, students' achievements depend largely on the quality of instruction and how the teachers manage the process.

According to Ellis (1990), children begin to develop attitude and appreciation of mathematics ideas from their very first encounter with mathematical concepts. They should also be placed in learning environment that make them interested to learn. Kitchen, Depree, et al. (2007) reiterated that schools must create a safe and positive place to engage in the study of mathematical content so that students respond by seriously learning. As second parents teachers must be able to develop the right attitude of their learners in mathematics so that they will acquire the necessary skills to succeed in their future roles in the society.

Generally, children have need for physical exercise and activities. They want to use their muscles to run, jump, skate and ride a bike, and to be out in the fresh air. They use their body energy when they play outdoors, and find such physical activities interesting and challenging (Alfano, 2007). This observation could be utilized to make learning enjoyable and fun to do (Bruner, 2012). He proposed that students should be engaged actively in classroom procedures.

One of the aims of modern curriculum is to provide experiential learning area where the learner can apply practical knowledge and life skills (Zulueta and Guimbatan, 2002). Elementary education should provide learning experiences which increase the child's awareness of and responsiveness to the changes in and demands of society and to prepare him for constructive and effective involvement (Zulueta and Guimbatan, 2002).

Early models of mathematics learning emerged to help teachers in making their students learn. Today, mathematics education in the country is anchored on the k-12 framework. Caine and Caine (1994) stressed that students learn by implementing twelve the principles of brain-based theory learning into the curriculum. According to this theory students must be mentally and physically active in the learning process. As the brain processes information when it is presented in integrated wholes, each child learn in his or her own way and time (Bredskamp and Copple 1997). Thus, a learning environment conducive to active learning is important. Arends, Winitzky, and Tannenbaun (2001) noted that organization of learning environment has a profound effects on learning. Children unconsciously display courteous attitudes in an environment that is physically adjusted to their needs (Wandberg and Rohwer 2003).

Teaching mathematics in an outdoor setting usually refers to school children solving practical problems using whichever forms of mathematics they

find appropriate (Molander, Hedberg, et al, 2007). Llego (2015) said that utilizing outdoor mathematics can be a good approach for student to explore and investigate the things around the environment that provide concretization of the abstract concepts in mathematics.

The primary purpose of formal education is to develop the interest and enthusiasm of the learners that will have long-term effects. Good and appropriate motivation really contributes to the academic success of an individual learner. However, motivation should be within the level of pupils' interest, abilities and aspiration in education. A learner who is motivated, will become active and aggressive for the attainment of planned goals (Tella, 2007).

This famous quote: "Tell me and I'll listen. Show me and I'll understand. Involve me and I'll learn" by Teton Lakota Indian has influenced the teaching of mathematics early on. Today, many educators want pupils to actively engage while learning the subjects not only inside the classroom but also to the community. This active involvement suggests that teachers must act as facilitators in the teaching and learning process and no longer the traditional teacher utilizing 85 percent of lecturing.

Mathematics can also be pursued for its sake. Russell, (1970) said that "Mathematics when rightly viewed possesses not only knowledge but extreme beauty".

The aforecited problems, observations, literature, experiences and Russell's words of wisdom inspired the pursuit of this study.

Conceptual Framework

Effective teachers recognize that when students are involved in learning, their achievement, enthusiasm and attitude are enhance. This study investigated the effects of outdoor mathematics, specifically on the achievement of grade six pupils. It also tried to find out the effects of teaching mathematics outside the classroom on students' enthusiasm and attitude towards mathematics.

The conceptual paradigm of this study is shown in Figure 1. The independent variable is outdoor mathematics. The dependent variables are mathematics achievement, enthusiasm and attitude. This study sought find out the effects of outdoor mathematics on the students' enthusiasm, attitude and achievement. That is, the outdoor mathematics is the learning environment in teaching mathematics.

Outdoor learning provides children with hands-on experiences that are often not reflected in an indoor environment. It has been a talking point throughout the centuries, John Dewey (1952) and Johann Pestalozzi (1827) believed that children learn by doing. Dewey suggested that education should be based on a child's own interest and instinct Wilkinson (2013). Further, in constructivist's view, learning is an active process in which learning is developed

on the basis of experience (Belecina, 2008). Jean-Jacque Rousseau believed that living in nature would lead to a virtuous life. Nature had a strong influence in Rousseau's Theories of Education (Doyle and Smith, 2007). He believed that early education should promote direct contact with the physical world. Students should not use books in an early age. Another theorist of learning encouraging active pupils' engagement is Vigotsky (1931) as cited by Driscoll (2000). Thus, school activities should be reality based and are applicable in the real world or outdoor environment where cooperation among the learners is expected. Similarly Gianouteos (2006) said that John Locke (1987) believed that curiosity motivates children to learn through nature, where pupils are able to ask questions and find answers to them. Locke also believed that a happy learner is one that is assisted in exploring the world. The proposed teaching modality provides varied outdoor learning activities that help the learners construct their mathematical skills through social interaction.

Usually, people imagine a child learning inside the classroom. However learning can take place anywhere in outside environment or inside the classroom and in all weather (Fabian, 2005). Outdoor Education affects the learners in a way that indoor and books cannot, as well as improve their health both physically and mentally (Helgadottir, 2013). In Iceland, outdoor education has become popular. It is where outdoor lessons involve children in learning and enable them to use their all senses to experience real life and nature (Jonsdottir, 2010).

Further, children are taught about nature and outdoor lessons in mathematics. Wilkinson (2013) emphasized that outdoor education should be available in all children no matter their age and ability. There are also suggestions that hands on experiences with nature should begin in an early age Knight (20011).

Some teachers found outdoor mathematics teaching doable, Pittman (2011) as cited by Skouruopathis (2013) used outdoors in teaching mathematics. He said that he used the mathematics books as a starting point and then transformed it into an outdoor activity designed to meet the needs of the class. In 2010, Moffet used the mathematics trail to engage his students in learning mathematics. The opportunities derived from it can help students create links between knowledge acquired indoors to their outdoor experiences.

There are other factors that may influence learning mathematics. They include enthusiasm and attitude. Enthusiasm is defined as strong warmth of feeling or keen interest in something. Many teachers think that it is very important to develop the enthusiasm of students in mathematics. One of the purposes of this study was to find out if teaching mathematics in an outdoor environment was able to change the negative attitude of the students in the subject. This study looked into the eagerness and excitement of the students in attending math classes, studying lessons and doing the assigned mathematics task.

Another aim of this study was to find how the pupils valued mathematics when engaged in an outdoor setting. It measured the attitude of the students towards mathematics. Attitude toward mathematics is defined as the positive or negative emotional disposition (Sriraman 2008). Soliven (2004) encouraged the mathematics teachers to select and use varied strategies suited to the level of understanding of their students to develop favorable attitude towards mathematics. This study measured the extent to which the grade six pupils in experimental and control groups liked or disliked mathematics after having been engaged in different teaching methods. Finally, the study also measures how the students value mathematics in general.

The conceptual paradigm that follows diagrammatically shows how outdoor mathematics may relate to the enthusiasm, attitude and achievement of grade six students.

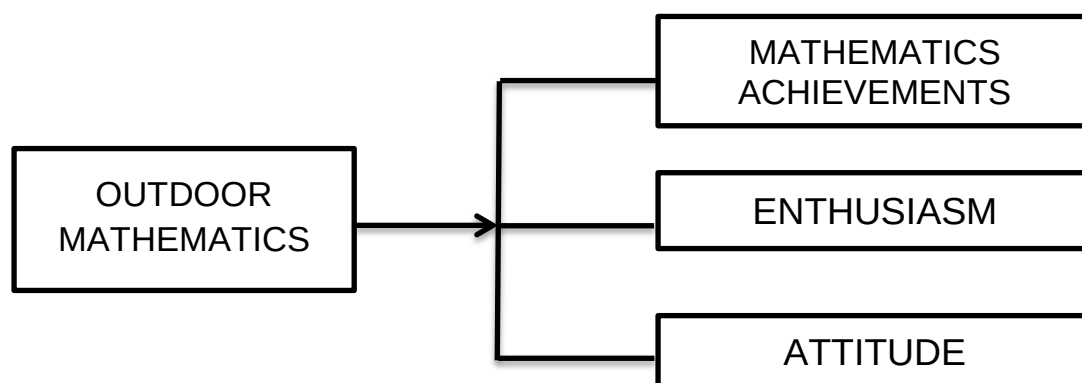


Figure 1 Conceptual Paradigm

Statement of the Problem

The purpose of the study was to determine the effects of outdoor mathematics on the enthusiasm, attitude and mathematics achievement of grade six pupils.

Specifically, it sought to answers the following questions:

1. What are the pretest and posttest means of the experimental and control group in terms of:
 - 1.1 Enthusiasm
 - 1.2 Attitude
 - 1.3 Mathematics Achievement
2. Is there a significant difference in the pre-test and post-test means of the respondents in experimental group in terms of the following:
 - 2.1 Enthusiasm
 - 2.2 Attitude
 - 2.3 Mathematics Achievement
3. Is there a significant difference in the pre-test and post-test means of the respondents in the control group in terms of the following:
 - 3.1 Enthusiasm
 - 3.2 Attitude
 - 3.3 Mathematics Achievement

4. Is there a significant difference in the means of the respondents in the experimental and the control group after the treatment in terms of the following:

- 4.1 Enthusiasm

- 4.2 Attitude

- 4.3 Mathematics Achievement

Research Hypotheses

The following hypotheses were tested at 0.05 level of significance.

1. There is no significant difference between the pretest and posttest means of the experimental group in terms of enthusiasm, attitude and mathematics achievement.
2. There is no significant difference between the pretest and posttest means of the control group in terms of enthusiasm, attitude and mathematics achievement.
3. There is no significant difference in the posttest means of the experimental and control group in terms of enthusiasm, attitude and mathematics achievement.

Significance of the Study

This study is significant as it provides a deeper and wider understanding of the effects of teaching mathematics outside the classroom using different kinds of mathematical games, group activities and mathematics trails on the enthusiasm, attitude and mathematics achievements of grade six pupils in Jose Zavalla Memorial Elementary School.

The result of this will be beneficial to the following:

- **Mathematics Teachers.** The result of this research could make significant contribution to the teachers of mathematics as they continue to search for the best teaching practices in teaching mathematics. Traditional teachers can consider using outdoor facilities in teaching the subjects so that students would be able to enjoy learning mathematics.
- **Learners.** The teaching modality may be found to be fun. It will be a great help to students develop other types of games in mathematics. The results of this study will also help them realize that mathematics is not scary subject.
- **Future Educators.** They may find outdoor mathematics as an alternative method of teaching mathematics as they continue searching for effective ways to teach the subject.

- **Future Researcher.** Future researcher may find the results of this study useful as they explore the field of mathematics searching for solutions to the nagging problems of mathematics education.
- **Parents.** The result of this study will help the parents understand the effect of affective factors that influence the grades of their children in mathematics.
- **Curriculum Planner, Principal and Supervisor.** The results of this study will help them conduct seminars and training for mathematics teachers using outdoor mathematics. It will also help them guide the teachers during observation period and suggest some activities that will improve the enthusiasm, attitude and mathematics achievements of the learners. Findings of this research will also serve as guide in developing learning materials with integration of outdoor activities in different areas.

Scope and Delimitation of the Study

This study was confined to outdoor mathematics and its effects on the enthusiasm, attitude and mathematics achievement of selected grade six pupils of Jose Zavalla Memorial Elementary School City of Santa Rosa Laguna.

The learning areas covered in this study was limited to selected topics in ratio and proportions, percentage and its application. The experiment period

lasted for almost eight weeks. The students' achievement in mathematics is based on the pretest and posttest scores obtained in the achievement test.

Enthusiasm towards mathematics focused on pupils' keen interest in learning mathematics while attitude towards mathematics was delimited to how pupils value mathematics as a whole.

Definitions of Terms

The following terms are hereby operationally and conceptually defined in this study for better understanding:

Outdoor Mathematics. It is the process of teaching and learning mathematics outside the formal classroom. In this study it pertains to the process of learning mathematics outside the classroom among grade six students of Jose Zavalla Memorial Elementary School done outside the classroom. It is also used as a term in teaching mathematics using different techniques such as different kinds of games (ball, sports, individual and group games) field trip and other authentic situations that necessitate active participations of grade six students outside the typical classroom. Outside the classroom, students manipulate objects and use their energies in learning mathematics lessons.

Mathematics Achievement. This refers to the measure of learning in specific content areas (Woolfolk, 2001). In this study it refers as the overall rating

of the experimental and control group to the pre-test and the post-test administered to the respondents. It also pertains to the measure of learning grade six pupils in mathematics during the experimental period.

Enthusiasm. It is defined as strong warmth of feeling or keen interest in something, (Huitt, 2005). In this study it pertains to the feeling of excitement and active interest of grade six pupils in learning the selected mathematics lessons under third grading period specifically ratio, proportion and percentage. It is also the overall rating given by the respondents to the enthusiasm scale used in the study.

Attitude. This refers to choice of personal actions based on the internal states of understanding and feeling. In this study it pertains to the acting or feeling of the respondents towards mathematics. It is also the overall rating given by the respondents to the attitude scale used in the study.

CHAPTER 2

REVIEW OF RELATED LITERATURE

This chapter contains reviews of the related studies and literature relevant to this seminar paper. These reviews also provided better insights into various perspectives deemed related to this study.

Outdoor Mathematics

According to the Countryside Alliance Foundation (2010), outdoor learning helps children acquire practical understanding of the world around them, develop self-confidence and skills, take managed risks and develop a sense of responsibility. Children naturally love to stay in outdoor than indoor. They want to explore the nature as everything they find outdoors is new and exciting for them. (www.uwstout.edu 2007).It will also help pupils to be creative and use their curiosity to a more effective exploration. It will also help the learners to realize that outdoor environment offers learning opportunities and enjoyment. (www.ncetm.org.uk, 2015)

Getting out of the classroom facilitates is an experiential learning. It gives better access to the main pathways to learning where pupils not only experience mathematics in concrete settings, but liberate them from restrictive expectations in the classroom (www.ncetm.org.uk, 2015). Further, outdoor learning has

different benefits such as higher levels of motivation on the part of the learners; they will also use almost limitless resources. In addition, the application of problem solving strategies and thinking skills will become more meaningful (www.ncetm.org.uk 2015).

Togno, (2001), in her study that tried to find out the effects of outdoor mathematics in trigonometry class concluded that experimental group performed better in trigonometry compared to control group. The result is consistent with the findings of Hattie et al. (1997) who engaged in a study involving adventure program, such program can obtain notable outcomes and have particularly strong, lasting effects.

The United States Fish and Wildlife Service (USFWS) 2007 stated that outdoor experiences help reduce stress and protect psychological well-being especially in children undergoing stressful life. Further, schools that encourage the use outdoor experiences produce significant results on students' gain in social studies, science, language arts and mathematics (USFWS, 2007).

Fägerstam and Blom (2012) conducted a study about learning biology and mathematics outdoors. Result of the study showed that the students who received outdoor biology instruction, increased levels of long-term retention and used higher frequencies of course content-related words to describe course activities

and content vividly. Further, students revealed more positive and enthusiastic attitudes toward outdoor learning.

The study of Neill (1999) on the impact of outdoor education programs offers a substantial theoretical and empirical review and investigation of the effects and mechanism of outdoor education programs. The scope and rigour of the study contributed a solid research platform for further development of theoretically-oriented, evidence-based outdoor education studies and for further exploration of possible methodologies for life development.

A recent trend in Swedish elementary schools is an increasing interest to teach mathematics in an outdoor setting. Teachers believe that using outdoor setting motivates the students more than solving word problems found in textbooks thus offering new ways to teach abstract mathematical concepts (Lövgren, 2007).

In 2010, Malaysian publisher Elsevier came out with a study about exposing the fun side of mathematics via mathematics camp. The result of the study showed that there is no relationship between students' understanding on the mathematics camp's module and their streams. It seems that the modules are applicable to both pure science and social science stream. On the other sides students were satisfied with the overall conduct of the mathematics camp.

They felt that this camp was very useful and helped improve their mathematical skills and knowledge.

In the study of Jegede, and Awodun, (2015) showed that there was significant difference in the attitude of students to Physics in the experimental group. Based on the findings of the study, it was recommended that non-conventional teaching approaches such as using out-door activities be introduced in the teaching of Physics. Physics teachers should be encouraged to make use of these new teaching approaches.

Martin and Zaukonva (2004) in their study showed that there was significant difference in the fifth-grade treatment group with regard to environmental knowledge and comfort levels in the outdoors, as well as the significant gender differences in the fifth-grade treatment group with environmental attitudes and behaviors. These indicate the potential for the effective use of the schoolyard for environmental education activities.

On outdoor adventure, Harper and Robinson (2005) discovered that leaders working in the outdoor adventure field are faced with making critical decisions on safety. Students who experienced outdoor learn to be safe from the perils of risk-related activities while enabling them to benefit from these experiences.

Tallent (2007), a UK-based educational consultant, worked extensively with schools to develop their outdoor spaces into learning environments. She believes that by focusing on activities and skill development, it is possible to develop outdoor learning curriculum.

Enthusiasm towards Mathematics

Velez (2014) a Professor in the Department of Mathematics at the University of Arizona said that for the students to develop enthusiasm in mathematics, educators should provide enthusiastic activities for the learners. Citing his experiences, he added that he would always talk to his students and guides them towards their goal in the subjects taught. He further suggested that educators should not teach only the mathematical facts to the students but to show them that learning mathematics is very interesting and applicable to their lives.

Peale (2003) asked Edward V. Appleton, a Scottish physicist whose scientific discoveries made possible worldwide and a Nobel Prize winner the secret of his amazing achievements. Appleton revealed that it was enthusiasm that made him creative. He further said that he considered enthusiasm above professional skills. Enthusiasm is a dynamic motivator that keeps one persistently working towards a goal. Further, Peale (2003) also concludes that

the fortunate individuals who achieved the most in life are invariably activated by enthusiasm.

Gawlowicz (2008) cited how Prof Anthony Harkin, the winner Richard and Virginia Eisenhart Provost's Award for Excellence in Teaching, inspired his students by bringing enthusiasm and curiosity in the classroom. Harkin said that mathematicians should really love what they do. From his experience Harkin tried to convey to his students the fun of exploring the frontiers of mathematics and science and being able to work on different kinds of projects they are surrounded with.

O'Shea (2009) concluded in her study that learning mathematics in an outdoor setting helped the fifth and sixth graders to become enthusiastic and lively in every lesson, these pupils were eventually found to be prepared for high school. It also helped them to experience freedom to move around and escape the confines of the classroom. A similar study made by Ballantyne and Parker (2002) showed that younger children are significantly more enthusiastic than adolescents. Further, Wilkinson (2013) predicted that if outdoor learning is common during early age, perhaps such studies on adolescents would yield different results.

Motivating students to be enthusiastically receptive is one of the most important aspects of mathematics instruction and a critical aspect of the

Common Core State Standards. Effective teachers should focus attention on the less interested students as well as the motivated ones (Posamentier 2013). The brain needs some challenge to activate emotions and learning (Caine and Caine 1995). Teachers should create places that are not only safe to learn, but should spark some emotional interest (Green 1999).

In the study conducted by Soliven (2004), she recommended that learners should be taught the mathematical skills possibly in the most interesting way to enhance enthusiasm towards the subject. Indeed, some mathematics teachers are not nurturing and caring enough to make students active and creative in learning mathematics. Many of our mathematics teachers today are still confined to the traditional method of teaching.

Gilderdale and Kiddle (2011) suggested techniques on how to stimulate pupils' enthusiasm in mathematics. First they suggest by using a wide range of task and resources. Second, instruction must provide plenty of opportunities for students to experience success that is why hands-on approaches to learning are important. Third, teachers must also offer positive models of mathematicians. Schools must also provide real life examples and explore links with other subjects. Most important of all, make mathematics enjoyable by engaging the students in math challenges, competitions puzzles, and teachers must celebrate achievements.

Attitude towards Mathematics

Psychologists define 'attitude' as any strong belief or feeling or any approval or disapproval toward people and situations. We have favourable or unfavourable attitudes towards people, politics, academic subjects, etc. We favor the things we think are good and helpful, and oppose the things we think are bad and harmful Kagan (1984) as cited by (Kiamanesh & Kheirich, 2001). The pupils' attitude towards mathematics is a crucial factor in learning and achievement in that subject (Stodalsky et al.,1991) mentioned that students develop ideas, feelings and attitudes about school subjects over time and from a variety of sources.

Bustos and Espiritu (1996) explained that internal forces like students attitude may result may result to a higher or lower performance in the subject. In the study on attitude, Enemark and Wise as cited by Akkaya and Memnum (2012) concluded that attitudinal variables were significant indicators of mathematical achievement. A few of the attitudinal variables also showed strong relationship with mathematics achievement even after background academic orientation variables were controlled.

Many studies have examined students' thinking about school and their attitude towards mathematics (Papanastasiou 2000). This interest may have been born out of a nagging perception that attitude influences performance. In

1993 Rech, undertook a correlational study on mathematical competences and attitudes of elementary education majors. The outcomes of the investigation revealed that elementary education majors possessed more negative attitudes than positive attitude towards mathematics. Significant positive correlation existed between years of high school mathematics and attitude, competency and achievement.

Another study conducted by Farooq and Shal (2008) found that positive attitude towards mathematics caused an individual to learn more effectively. It was observed that students achieve better in mathematics if they like mathematics. In the study of Michelle (2013) that there is a relationship exists between the students' attitude towards mathematics and performance in arithmetic computation skills in problem solving. The same findings were held by Cheung (2011) she said that a significant relationship exists between attitude towards mathematics and academic performance. In 2006, another study conducted by Dequito proved that there was a significant positive relationship between the students' attitude towards mathematics and their achievement in mathematics. The same results were obtained by Schenkel (2009). He found significant positive effects of attitude on mathematics achievements.

Recent studies involving attitude confirm previous results. Mohamed and Waheed (2011) in their study about the Secondary Students' Attitude towards Mathematics in a Selected School of Maldives noted that, since the students'

positive attitude towards mathematics is at medium level, they were optimistic that there is still possible room for improvement. Vis-à-vis the lower performance of Maldivian students in mathematics, the attitude of the respondents of this study was fairly positive.

On the other hand Gloriana (2011) concluded in her study that attitude towards mathematics and achievement in Intermediate Algebra of the students has no significant relationship. Furthermore, Miranda (2008) recommended using interesting techniques in teaching that will make mathematics interesting and enjoyable to learners. Miranda (2008) also revealed in her study that teachers' practices influenced attitude of students towards mathematics.

Thompson, Aspinall & Motarzino (2008) cited in their study that the experiences of children in natural environment are predictors of positive attitude towards natural space. Wells and Lekies (2006) concluded that experiences of children with nature can be an important pathway to environmental attitude of adults.

Rickinsons et al. (2004) concluded that outdoor adventure has positive effects on the attitude, beliefs, self-perceptions as well as interpersonal and social skills of the young people.

The study of Abens (2008) revealed that using outdoor educations helped majority of the students enjoyed mathematics. She also found that students enhance positive attitude towards learning outside in any subjects.

Mathematics Achievement

In this study, mathematics achievement is the measure of learning in mathematics on selected areas of content. Since it is one of the three variables, it has to be carefully determined if indeed it is attributed to the outdoor mathematics.

According to Bandura (1997), the real performance of students could be measured in a test. However, they should be well motivated to do well in a test to reveal that they really achieved from instruction. Test scores resulting from the conduct of outdoor mathematics have important implications to mathematics educations.

In her study about outdoor learning Norodahl (2010) found that the vocabulary of children increased when given the opportunity to learn in an outdoor environment. The study of Dowdell, Gray and Malone (2011) has also found natural environment support and increase children's imagination and interest in the world around them. The conduct of formal classes within the confines of a classroom does not guarantee success. Learning styles should be known and teachers should utilize this knowledge for instructional purposes

(Wandberg and Rohwer, 2003). Research reveals factors such as language, low self-esteem, school environment and the like affect mathematics achievement according to Nilas (2002).

Another study on mathematics achievement correlates include method of instructions and subject areas and computing skills (Baruah, 2010). Some significantly correlated variables were subjected to regression analysis either to explain variability or to predict success.

Synthesis

Outdoor education is very important especially in the present situation where pupils feel bored inside the classroom. Outdoor mathematics is now being used in different countries especially in United Kingdom and Sweden (Lövgren, 2007 and Tellent (2007). Outdoor mathematics has favourable outcomes with long lasting effects in certain mathematics class. When learners are engaged in outdoor activities, researches reveal that they become creative, full of energy and enthusiastic and develop positive attitude. To foster enthusiasm and positive attitude among students, educators should provide a wide range of activities that help students enjoy learning the subject.

Based on the different aforecited studies, outdoor mathematics correlates with achievement and personal traits. Inspired by the developments in

mathematics education, this study was conceptualized. Among the personal variables, enthusiasm is least explored as it usually embedded in attitude scale.

Further researches conducted in other countries have consistent findings on the effectiveness of outdoor mathematics specifically on personal variables. This study is sought to find out how well outdoor mathematics would affect mathematics achievement, enthusiasm and attitude.

CHAPTER 3

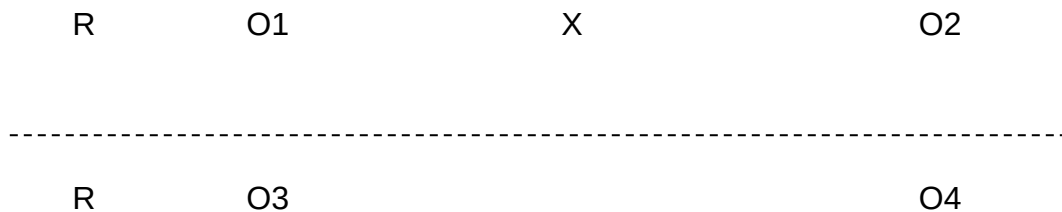
Research Methods and Procedures

This chapter describes the methods employed in the various stages of the study such as, instrumentation, sampling and data analysis.

Research Design

The study used the experimental design called the pretest-posttest control group design. It involves two groups formed through random assignment. Both groups are observed at some initial point (pretest) and then again after treatment is administered to the experimental group (posttest) Mason and Bramble, 1997)

The two groups were pretested with the three instrument used in this study. Then the pupils of the experimental group were subjected to the use of outdoor mathematics while the control group were subjected to the traditional method of teaching the subject for almost seven weeks. Post testing was done one week after the treatment (Dimitrov and Rumrill, 2003). The design is better conceptualized with the use of the following figures.



Where: R = Randomization
O1 and O2 = The Pre-test of the two groups
O3 and O4 = The Post-test of the two groups
X = the treatment in experimental group.

The research design was considered the most appropriate in this study because it provided the accurate processes that investigate the significant effects of outdoor mathematics on the enthusiasm, attitude and mathematics achievement.

Participants of the Study

The participants in this study were chosen using random sampling from the six sections in Grade Six pupils of Jose Zavalla Memorial Elementary School City of Santa Rosa Laguna, School Year 2015-2016. The first and last sections were not included in the sampling because they lack the characteristics of the respondents required in this study. The students in the first section were too knowledgeable as compared to other sections while the last section did not meet the requirements needed in this study. From the four sections remaining, two sections were selected to comprise the experimental group of and control group using lottery sampling. From these two sections, 35 pupils in each section were selected and assigned in experimental group and another 35 students were selected to comprise the control group. Characteristics of the students in the

experimental group in terms of age and grades in mathematics in the first and second quarter were matched. The list is shown in Appendix E. Table 1 which shows frequency distribution of the respondents.

Table 1
Frequency Distribution of Respondents

Group	Number of Pupils	Percent
Experimental	35	77.78%
Control Group	35	77.78%

Research Instruments

The following instruments were used in this study.

1. Achievement test

A developed test utilized in this study is found in Appendix E. The test consisted of topics in ratio and proportion, percentage and its applications. A Table of Specifications (TOS) was prepared and served as guide in making the test items as well as to determine the number of items to be included in each topic. In order to achieve the high quality of instruments, the following stages were utilized:

Stage 1. Preliminary Stage

To develop good instrument in mathematics achievement, different literature on assessment were read. Books about Measurement and Evaluation were also examined. All topics related to ratio and proportion, percentage were collected and examined. Also topics related to the study found in the internet were downloaded. Consultation with master teachers and experts were also done.

Stage 2. Writing and Validation

In this stage, a Table of Specifications was prepared to ensure a balanced distribution of items in the learning skills to be measured in this study. The first draft was initially prepared consisting of an eighty-item test as found in Appendix D. It was presented to the master teachers and research adviser for examination of content and other suggestions. The suggestions were adopted for the refinement of the instruments. The second draft was presented again to the experts for validation of the instrument. Comments and suggestions on the appropriateness, clarity of the language, correction in grammar and content served as guide in the revision of the items. After the revisions, the instrument was printed again and submitted to the adviser for some comments and suggestions before administering the first trial run.

First Trial Run

There were 80 items included in the first trial run. Test was tried out to Grade 7 students of Balibago National High School because topics in the test were not yet taken up in Grade Six for school year 2015-2016. It was only during the experimental period that those topics were discussed. The examinees were interviewed to further validate if they understood the vocabulary words used in the test. All test papers were scored and analyzed. Items with difficulty indexes of 0.20 to 0.80 and discrimination indexes of 0.30 to 0.80 were included in the final test. To determine items that were included in the second draft, the U-L method were utilized.

The final draft of the test was submitted to the adviser for further comments and suggestions which composed of 50 multiple choices items. All items were in proportion to the original items in the table of specification. Adjustments were done before finally administering the second and final run of the instrument among grade six pupils not included in the experiment.

2. Enthusiasm Scale

An enthusiasm scale was used to determine the progress made by the grade six pupils. This was in the form of questionnaire that used Likert scale to assess the effectiveness and acceptability of outdoor

mathematics and mathematics in general. An enthusiasm questionnaire was developed by the researcher after reading different articles in hard and soft copy as well as books about enthusiasm. Appropriate words suited to the comprehension of Grade Six pupils were used. The first draft was submitted to the adviser for comments and suggestions then to master teachers for other suggestions. Suggestions were adopted in the second draft of the instrument and submitted again to the research adviser for refinement. It was also presented to the three experts in the field of mathematics and psychology for validation. Their suggestions were adopted in the third and final drafts of the instrument before it was administered to Grade Six pupils not included in the experiment. Results were analysed and computed using spss program version 23. The reliability coefficient obtained was 0.794 using Cronbach's alpha. In short, the Enthusiasm Questionnaire has good reliability and can be used in this study.

3. Attitude Scale

An attitude scale was utilized to examine progress of the respondents. It was a questionnaire that uses Likert scale to assess the effects of outdoor mathematics and mathematics subject in general. It was adopted from the study of Poquiz (2005) and other attitude scale that used grade six pupils as their respondents. The first draft was presented to the

research adviser. The language used and the choice of words were corrected and adopted to the second draft of the instrument. The second draft was presented to three experts in the field of mathematics and human behavior for validation. Suggestions of the experts were adopted in the third and final draft of the instrument. The questionnaire was tested to the Grade Six pupils not included in the experiment. Participants were interviewed to find out if they understood the words used in the questionnaire. Results of the trial run were computed and analysed using SPSS software 23. The reliability coefficient obtained was 0.797 using Cronbach's alpha. The attitude scale has high reliability and can be used in this study.

4. Lesson Plan

A daily lesson plan was utilized in this study. In experimental group, the Daily Lesson Log type was used (DLL Plan). Parts of the DLL consist of activity, analysis, abstraction and application (4 A's) that are adopted in the K-12 curriculum. On the other hand, the lessons plan of the Bureau of Elementary Education, Department of Education was used in the control group. Evaluation of every lesson was the same in experimental and control group.

Data Gathering Procedure

A developed achievement test and questionnaire helped identify the effects of outdoor mathematics in terms of enthusiasm, attitude and mathematics achievements of the respondents towards mathematics. The following phases were done to gather data required in this study:

Phase 1 Pre-Experimental Phase

At the start, permission from the City Schools Division Superintendent of City of Santa Rosa Laguna, Dr. Catherine Talavera and the school head of Jose Zavalla Memorial Elementary School Mr. Francis G. Baltazar to use the randomly selected group of grade six pupils that are enrolled in SY 2015-2016 to be the participants in his study were secured. Before the experiment was conducted, pre-test were given to the experimental and control groups.

Phase 2 Experimental Phase

Experimental period was conducted from October 8 up to December 1, 2015 covering two units of the topics for third grading period, which are ratio and proportion and percent. The experiment period covered almost 8 weeks, from monday to friday at one hour per day on a total of five hours a week.

The experimental group was taught outside the classroom using different kinds of individual and group activities that included games, fieldtrip, gardening

and other outdoor learning activities. The experimental group were divided into smaller groups daily using random assignment. Contest of groups were also conducted. During group activities, each member was given chance to discuss their work in front of other groups. Facilities outside the classroom like space under the tree served as learning area in the discussion of mathematics concepts. Fieldtrips inside and outside the school campus were conducted to facilitate learning. Mathematics trails were also utilized. Individual and group activities were graded. Short evaluations were conducted daily to identify the comments and feedbacks of the students in the activity. Filipino version was accepted in the oral evaluation. The entire experimental period was done outside the classroom.

On the other hand, the control group was taught using the traditional technique of teaching mathematics. Sometimes they have group activities but conducted inside the classroom. The short quizzes for the control group were the same in experimental group.

Phase 3 Post-Experimental Phase

After the experimental period, the experimental and control group were given post-test in terms of enthusiasm, attitude and mathematics achievement. Test items in the post test were the same as the pre-test.

Data Analysis Procedure

All the data gathered from the respondents were treated using the following statistical tools.

The **mean and standard deviation** were used to describe the pretest and posttest scores obtained by the experimental and control group of students in enthusiasm scale, attitude scale and mathematics achievement test. In each group **t-test for dependent variables** was used to determine if a significant difference in the pretest and posttest scores in the enthusiasm scale, attitude scale and mathematics achievement test. To determine the significant difference in the posttest scores of the experimental group and control group in the enthusiasm scale, attitude scale and achievement test, **t-test for independent variables** were utilized. Statistical Packages for Social Sciences (SPSS) were used to process all statistical computations.

Chapter IV

Presentation, Analysis and Interpretation of Data

This chapter presents the data gathered, their analysis and interpretation. The data were gathered and collected from grade six students of Jose Zavalla Memorial Elementary School in City of Santa Rosa Laguna.

Problem 1: What are the pretest and posttest mean scores of the experimental and control group in terms of enthusiasm, attitude and mathematics achievement?

Table 2 presents the pretest and posttest scores of the respondents in terms of enthusiasm, attitude and mathematics achievement.

Table 2
Prettest and Posttest Means of the Experimental and Control Groups

Variables		Experimental Group			Control Group		
		Mean	Standard Deviation	Interpretation	Mean	Standard Deviation	Interpretation
Enthusiasm	Pretest	2.90	0.25	Positive Enthusiasm	2.46	0.19	Negative Enthusiasm
	Posttest	3.36	0.31	Positive Enthusiasm	2.47	0.25	Negative Enthusiasm
Attitude	Pretest	2.87	0.28	Positive Attitude	3.06	0.37	Positive Attitude
	Posttest	3.24	0.29	Positive Attitude	3.06	0.34	Positive Attitude
Mathematics Achievement	Pretest	19.86	4.26	Average Mastery	20.86	6.57	Average Mastery
	Posttest	26.66	7.21	Average Mastery	26.74	7.00	Average Mastery

Table 2 shows that the two groups of students have average mastery level using the scale used by the Department of Education in interpreting the data obtained in the National Achievement Test for Grade Six pupils administered yearly. The results imply that mathematics performance of the students in the experimental group and in the control group in mathematics are comparable.

Problem 2: Is there a significant difference in the pretest and posttest means of the experimental group in terms of enthusiasm, attitude and mathematics achievement?

To determine the effects of outdoor mathematics on the enthusiasm, attitude and mathematics achievement of the students in experimental group, their pretest and posttest means were compared.

Table 3
Comparison of the Pre-Test and Post-Test Means of the Experimental Group

Variables		Mean	Standard Deviation	t-value	p-value	Interpretation
Enthusiasm	Pretest	2.90	0.25	-6.48	0.00	Significant
	Posttest	3.35	0.31			
Attitude	Pretest	2.87	0.28	-5.26	0.00	Significant
	Posttest	3.24	0.29			
Mathematics Achievements	Pretest	19.87	4.26	-12.10	0.00	Significant
	Posttest	26.66	7.21			

The table three shows that there is significant difference in the mean scores of the experimental group in terms of enthusiasm, attitude and mathematics achievement when tested at 0.05 level of significance. It implies that the enthusiasm, attitude and mathematics achievement of the experimental group increase significantly after exposure to outdoor mathematics. The findings support the study of Wells (2000) which revealed that exposure of children to natural setting increases their ability to focus resulting to enhanced cognitive abilities.

Majority of the students in experimental group always wanted to go outside and learn mathematics. They agreed that they learned a lot from the lessons taken in the outdoor setting. The following were their comments most of the time.

“Masaya ang outdoor mathematics namin dahil marami kaming natututunan”.

(It's more fun doing the outdoor mathematics because we learn more.)

“Mas natuto ako sa outdoor, sana lagi nalang may outdoor”.

(I learn the topics easily through outdoor mathematics; I hope outdoor mathematics will be utilized time to time)

“Ako ay masaya sa aming ginagawa sa math at marami kaming natututunan kaysa nasa loob at nakakapagod din an gaming ginagawa lalo na yong tatakbo ng whole court”

(Outdoor mathematics is very tiring however it is more fun and easy to understand compare to indoor discussion)

“Masakit po katawan namin, pero okay lang masaya naman po”

(I felt so much body pain but it's okay, it was still a great activity.)

Students in the experimental group enjoyed and learned a lot from the lesson in mathematics. Even though they experienced body pain after the games and other activities, still students in experimental group wanted to learn their lesson in mathematics outside the classroom. This result supports the study of Dymont (2005) where 90 percent of the respondents have shown positive enthusiasm and their learning engagement increases when exposed in green schools.

Even students in the other sections not exposed in outdoor mathematics wanted to have their math classes outside. They felt that lesson in mathematics when done outside that classroom is more enjoyable as compared to traditional setting.

“Sir lagi nalang kami sa loob, nakakasawa na dito, sa labas naman po tayo mag math”.

(Sir, make this outdoor mathematics regularly, we are sick and tired doing the traditional one)

“Sir mag math naman tayo sa labas kahit minsan lang para masaya”.

(I wish we can have our mathematics outside to make this subject more fun)

“Bakit po yong ibang section naglalaro sa math, kami hindi”

(Why did other sections have their mathematics period outside the room?)

“Kailan po tayo magmamath sa labas, nakakasawa po ditto sa room”

(I really feel the boredom here inside, why don't we have mathematics class outside the room)

During observation of classes conducted by the school head and education program supervisors in mathematics, science and Filipino. The following were their comments:

“Maganda pala ang outdoor math, active na active ang mga bata, talagang nagtatanong at nagkaclarify ng lesson”.

(It's very wonderful to have mathematics outside the room, students are very active and participating, they are looking forward for the activities.)

“Parang MSEP lang ang ginagawa, pero naguusap-usap talaga sila ng gagawin ayaw magpatalo, pwede pala mag math sa labas”.

(It seems like a P.E class, now I realize that outdoor activity is preferable in mathematics as well.)

“Pwedeng pwede ito lalo na sa maliliit na mga bata at ibang subjects”.

(It is really fit for the small pupils and other subjects.)

The school Principal and Education Program Supervisors (EPS) of different subjects agreed that outdoor mathematics helped the students to learn and enjoy mathematics. They further suggest letting the primary grade teachers used outdoors in teaching different subjects. Jaen (2015) concluded that positive attitude contributes a lot to performance.

Problem 3: Is there a significant difference in the pretest and post-test means of the control group in terms of enthusiasm, attitude and mathematics achievement?

Table 4 shows the summary of the mean scores obtained by the control group before and after the experiment in terms of enthusiasm, attitude and mathematics achievement.

Table 4
Comparison of the Pre-Test and Post-Test Means of the Control Group

Variables		Mean	Standard Deviation	t-value	p-value	Interpretation
Enthusiasm	Pretest	2.46	0.19	-0.073	0.94	Not Significant
	Posttest	2.47	0.25			
Attitude	Pretest	3.06	0.37	-0.057	0.96	Not Significant
	Posttest	3.06	0.33			
Mathematics Achievements	Pretest	20.86	6.57	-18.42	0.00	Significant
	Posttest	26.74	7.00			

The table shows that there is no significant difference in the means of the control group on the variables enthusiasm and attitude. However, a significant difference appears in their achievement scores. It seems that the students may

be eager to learn mathematics for the sake of learning mathematics. They may also be self-regulated realization that learners (Woolfolk, 2001) or well – motivated to undertake the learning task. When students are self -motivated, they tend to obtain desired outcomes (Bandura 1986 in Slavin, 2003).

Problem 4: Is there a significant difference in the posttest scores of the experimental and control group in terms of enthusiasm, attitude and mathematics achievement?

Table 5 shows the comparison of the posttest mean scores of the experimental group and the control group in terms of enthusiasm, attitude and mathematics achievement.

Table 5
Comparison of Mean Post-Test Score of the Control Group and Experimental Group

Variable	Group of Respondents	Mean	Standard Deviation	t-value	p-value	Interpretation
Enthusiasm	Experimental	3.36	0.31	2.45	0.00	Significant
	Control	2.47	0.25			
Attitude	Experimental	3.24	0.29	13.26	0.17	Significant
	Control	3.06	0.33			
Mathematics Achievements	Experimental	26.66	7.21	-0.50	0.96	Not Significant
	Control	26.74	7.00			

The table shows that a significant difference exist between posttest means of the two groups on the affect variables enthusiasm and attitude. The enhanced behaviors of the students in the experimental group on the affect variables are triangulated by their statements regarding their experiences in outdoor mathematics.

During outdoor mathematics activities, participants were asked about their comments on their learning experiences outdoor. The following comments were heard from them.

“Inaabangan ko lagi ang math dahil sa outdoor mathematics”.

(I look forward to my mathematics class because it is held outside)

“Go parin ng go, hindi tayo magpapatalo. Kaya natin to. Kaya nakikinig akong mabuti sa aking guro sa math dahil may gagawin daw kaming activity, kaya pag dating ko sa bahay nagaaral na ako ng leksyon sa math, pinagbubutihan ko”.

(I move on without let up. I cannot afford to lose. I can do it. I listen carefully to my teacher because of the activities given to us. At home, I study my math as well).

“Sa araw na ito ako ay masaya. Pinaglaro kami ni sir sa baba, marami kaming natutunan, natuto sa math at sa lahat ng pinagaralan namin. Sana Maulit ulit ang laro ang saya kasi”

(I am very happy today. Our math teacher made us play games related to our math lessons. We learned a lot in math. We hope to play again because it is enjoyable.)

Most of the students in the experimental group eagerly anticipated their math classes. Before they went home, they usually encouraged each other to study the next lesson at home. They usually discussed the topics among themselves daily because they wanted their particular group to plan their strategies to ensure success on the next day. They were excited in every lesson which resulted to improved attendance from October to November as compared to the attendance in the previous months.

As regards attitude, the students who experienced outdoor mathematics showed positive attitude towards mathematics. The following statements were their common remarks after each outdoor activity.

“Hindi nakakasawa ang math kapag sa outdoor”
(Outdoor mathematics is not boring)

“Subrang saya namin kahit nakakapagod at masakit sa hita”
(Although tiring, we enjoyed math activities)

The students believed that outdoor mathematics is fun and enjoyable. Most of them showed happy faces and engaged actively in the mathematics task. They were all interested and felt at ease in all the lessons. They also demonstrated self-confidence in sharing their ideas about the topics assigned to

every group. They participated actively in all group games, community field trips or brought materials necessary for the next lesson.

The level of affect behavior of enthusiasm and attitude are low for the control group but their energies seen to be focused on their academic learning task. They appear to be independent learners. Their characteristics in enthusiasm and attitude may be different from experimental group but both types of people may be equally knowledgeable about the task at hand (Woolfolk, 2001).

Chapter V

Summary of Findings, Conclusions and Recommendations

This chapter presents the findings, conclusions and recommendations based on the result of the study.

Summary

This study aimed to investigate the effects of outdoor mathematics on the enthusiasm, attitude and mathematics achievements of grade six pupils of Jose Zavalla Memorial Elementary School. The respondents were randomly chosen from the intact group using lottery sampling. The experimental group was taught mathematics in an outdoor setting while the control group was taught using the traditional method or inside the classroom setting. The pretest-posttest control group design was used to compare the mean scores of both groups in the variables enthusiasm, attitude and mathematics achievement. The t-test for dependent and independent samples were run on the data gathered to determine the significant difference in the pretest and posttest mean scores of the respondents in the enthusiasm scale, the attitude scale and the mathematics achievements.

Findings

The following are the findings of the study.

1. There is a significant difference in the pretest and posttest means of the experimental group on the variables enthusiasm, attitude, and mathematics achievement.
2. There is no significant difference in the pretest and posttest means of the control group on the variables enthusiasm and attitude while there is a significant difference in the pretest and posttest means.
3. There is significant difference in the posttest means of the experimental and control group in the variables enthusiasm and attitude but not in mathematics achievement.

Conclusions

Based on the findings of the study, the following conclusions are made:

1. Outdoor mathematics is effective in improving enthusiasm and attitude of the students in mathematics.

2. Students enjoy learning the subject when engaged in outdoor activities. In the long run, enhanced affective behavior may positively influence mathematics achievement.
3. Outdoor mathematics may make students like learning mathematics after all.

Recommendations

The following recommendations were made based on the findings of the study.

1. Mathematics teachers may use outdoor mathematics in teaching mathematics to improve students' attitude and enthusiasm towards mathematics.
2. Teachers should provide activities where students can actively engage during math lessons.
3. The department of education should provide learning materials with the integration of outdoor mathematics.
4. Future researchers can engage in a research combining quantitative and qualitative methods that covers wide array of topics to a larger group of respondents in different grade levels to determine the enthusiasm, mathematics achievement using outdoor mathematics.

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APPENDIX A
Letter of Request to the Superintendent

Date: September 21, 2015

Catherine P. Talavera Ph.D.

OIC – Office of the Schools Division Superintendent
 City of Santa Rosa Laguna

Ma'am:

Greeting of Peace and Joy!

The undersigned is a faculty member of Jose Zavalla Memorial Elementary School, City of Santa Rosa Laguna and a graduate student of Philippine Normal University. I am currently conducting a study entitled **“Effects of Outdoor Mathematics on the Enthusiasm, Attitude and Mathematics Achievement of Grade Six Pupils”** this academic year 2015-2016, a requirement leading to a Degree in Master of Arts in Teaching Mathematics.

In this regard, kindly allow me to conduct my research study in Jose Zavalla Memorial Elementary School.

Your kind-hearted support and cooperation is highly appreciated. Thank you very much and more power.

Yours Truly

NIMROD V. FERNANDEZ
 Researcher

Noted:

ELISA S. BACCAY, Ed.D.
 Adviser

Approved:

CATHERINE P. TALAVERA, Ph.D.
 OIC-Office of the Schools Division Superintendent

APPENDIX B
Letter of Request to the Principal

Date: September 21, 2015

Francis G. Baltazar
Principal
Jose Zavalla Memorial Elem. School
City of Santa Rosa Laguna

Sir:

Greeting of Peace and Joy!

The undersigned is a faculty member of Jose Zavalla Memorial Elementary School, City of Santa Rosa Laguna and a graduate student of Philippine Normal University. I am currently conducting a study entitled **“Effects of Outdoor Mathematics on the Enthusiasm, Attitude and Mathematics Achievement of Grade Six Pupils”** this academic year 2015-2016, a requirement leading to a Degree in Master of Arts in Teaching Mathematics.

In this regard, kindly allow me to conduct my research in Jose Zavalla Memorial Elementary School.

Your kind-hearted support and cooperation is highly appreciated. Thank you very much and more power.

Yours Truly

NIMROD V. FERNANDEZ
Researcher

Noted:

ELISA S. BACCAY, Ed.D.
Adviser

Approved:

FRANCIS G. BALTAZAR
Principal II

Date: September 28, 2015

Dr. Yolanda Sambajon

Principal

Balibago National High School

Balibago, City of Santa Rosa Laguna

Ma'am:

Greeting of Peace and Joy!

The undersigned is a faculty member of Jose Zavalla Memorial Elementary School, City of Santa Rosa Laguna and a graduate student of Philippine Normal University undertaking a research study entitled "**Effects of Outdoor Mathematics on the Enthusiasm, Attitude and Mathematics Achievement of Grade Six Pupils**" " this academic year 2015-2016, a requirement leading to a Degree in Master of Arts in Teaching Mathematics.

In this regard, I am humbly asking assistance from your good office to allow me to administer the trial run of my instrument among grade seven students in your school.

Your kind-hearted support and cooperation is highly appreciated. Thank you very much and more power.

Yours Truly

NIMROD V. FERNANDEZ

Researcher

Noted:

ELISA S. BACCAY, Ed.D.

Adviser

Approved:

YOLANDA SAMBAJON, Ed.D.

Principal IV

APPENDIX C
Letter of Request to the Validator

Date: September 8, 2015

Professor
Philippine Normal University
National Center for Teacher Education
Taft Avenue, Manila

Sir,

The undersigned is a faculty member of Jose Zavalla Memorial Elementary School, City of Santa Rosa Laguna and a graduate student of Philippine Normal University. I am currently conducting a study entitled **“Effects of Outdoor Mathematics on the Enthusiasm, Attitude and Mathematics Achievement of Grade Six Pupils”** this academic year 2015-2016, a requirement leading to a Degree in Master of Arts in Teaching Mathematics.

With your competence in teaching mathematics as well as your proficiency in the construction of test, I would like to ask for your whole hearted support and cooperation by answering the attached evaluation questionnaire thoroughly and be one of the evaluators of the attached teacher made test. Your honest response would be of great significance for the completion of this study.

Thank you very much.

Yours Truly,

NIMROD V. FERNANDEZ
Researcher

Noted:

ELISA S. BACCAY, Ed.D.
Adviser

Date: _____

Professor
Philippine Normal University
National Center for Teacher Education
Taft Avenue, Manila

Dear Educator,

The undersigned is a faculty member of Jose Zavalla Memorial Elementary School, City of Santa Rosa Laguna and a graduate student of Philippine Normal University undertaking a research study entitled **“Effects of Outdoor Mathematics on the Enthusiasm, Attitude and Mathematics Achievement of Grade Six Pupils”** ” this academic year 2015-2016, a requirement leading to a Degree in Master of Arts in Teaching Mathematics in Philippine Normal University Manila.

Please validate this instrument formulated to measure enthusiasm and attitude towards mathematics among grade six learners as to whether the statements are appropriate (A) or not appropriate (NA). Should you wish to give suggestions please indicate them at the end of the scale.

Thank you very much for your kind support to this study.

Yours Truly,

NIMROD V. FERNANDEZ
Researcher

APPENDIX D
Table of Specification for Mathematics Achievement (First Draft)

Topics: ratio , proportion and percent

LESSONS	Number of Days Taught	Number of Items	Item Placement	%
I. Ratio and Proportion				
a. Forming Ration and Proportion	1	3	1-3	3.75%
b. Reducing Ratio to Lowest Term	2	5	4-8	6.25%
c. Finding the missing term in a proportion	2	6	9-14	7.50%
d. Word problem involving Direct Proportion	2	5	15-19	6.25%
e. Word problems involving Partitive Proportion	2	5	20-24	6.25%
f. Word problems involving Inverse Proportion	2	6	25-30	7.50%
II. Percent				
a. Meaning of percentage , rate and base	1	3	31-33	3.75%
b. Finding the percentage when rate and base are given.	2	6	34-39	7.50%
c. Finding rate when percentage and base are given.	2	6	40-45	7.50%
d. Finding base when percentage and rate are given.	2	5	46-50	6.25%
e. Mental computation of common percentage.	1	3	51-53	3.75%
f. Percent of increase/decrease in discounts, original price, rate of discount, sale price and mark up price.	3	7	54-60	10%
g. Commission, rate of commission, total sales and total income.	3	8	61-68	8.75%
h. Sales tax and selling price.	2	5	69-73	6.25%
i. Simple interest, principal, rate and time.	3	7	74-80	8.75%
	30	80		100%

APPENDIX E

MATHEMATICS ACHEIVEMENT TEST (First Draft)

Name: _____

Date: _____

Year and Section: _____ Score: _____

I. **Directions:** Encircle the letter of the correct answer.

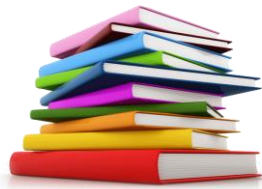
1. Give the ratio of the square to circle.



- a. 6:4 b. 4:6 **c. 3:2** d. 2:3

Remarks: _____

2. What is the ratio of the crayon to books?



- a. **3:5** b. 6:10 c. 10:6 d. 5:3

Remarks: _____

3. What is the ratio of flowers to leaves?



- a. 16:10 b. 10:16 c. 5:8 **d. 8:5**

Remarks: _____
 _____.

4. Which ratio is expressed in lowest term?

- a. 12:15 **b. 3:4** c. 5:20 d. 12:18

Remarks: _____
 _____.

5. Which of the following ratios is not expressed in lowest term?

- a. 2:3 **b. 4:6** c. 4: 5 d. 7:9

Remarks: _____
 _____.

6. What is the lowest term of 18:24?

- a. 36:48 b. 9:12 **c. 3:4** d. 4:3

Remarks: _____
 _____.

7. The following ratios are express in lowest term except.

- a. 1:3 b. 4:7 **c. 8:10** d. 11:13

Remarks: _____
 _____.

8. What is the ration of 15 minutes to 1 hour written in lowest term?

- a. 15:1 b. 1:15 **c. 1:4** d. 4:1

Remarks: _____
 _____.

9. What is the value of N in 9: N = 27:15?

- a. **5** b. 10 c. 18 d. 20

Remarks: _____
 _____.

10. What is the value of X in $4:7 = X:14$?

- a. 4 b. 6 **c. 8** d. 10

Remarks: _____
_____.

11. What is the missing term in $N/24 = 11/12$?

- a. 12 b. 18 **c. 24** d. 36

Remarks: _____
_____.

12. Find the missing term to make the proportion true in $5/3 = 25/N$?

- a. **15** b. 20 c. 25 d. 28

Remarks: _____
_____.

13. What number compared to 10 is the same as 28 compared to 5?

- a. 14 b. 15 c. 28 **d. 56**

Remarks: _____
_____.

14. Six compared to 12 is the same as 18 compared to what number?

- a. 30 b. 18 c. 24 **d. 36**

Remarks: _____
_____.

15. School canteen sells 6 pcs of pad paper cost 1 peso, what is the cost of 30 pcs of pad paper?

- a. P4.00 **b. P5.00** c. P6.00 d. P 7.00

Remarks: _____
_____.

16. A vendor sell imported apples at 3 pcs per P100, how much will 9pcs cost?

- a. P150** b. P200 c. P250 **d. P300**

Remarks: _____
_____.

17. The ratio of two numbers is 3:5. The larger number is 30. What is the smaller number?

- a. 12 b. 15 **c. 18** d. 21

b. Remarks: _____
_____.

18. The ratio of areas of two squares is 1:4. The area of smaller square is 12. What is the area of the larger square?

- a. 36 **b. 48** c. 60 d. 72

Remarks: _____
_____.

19. A car travels 15 kms on 1 litre of diesel. At the same rate about how far can it travel on 5 litres of diesel?

- a. 60kms **b. 75kms** c. 90kms d. 120kms

Remarks: _____
_____.

20. Two numbers are in the ratio of 2:3. If the sum is 40, what are the numbers?

- a. 12 and 28 b. 24 and 12 c. 15 and 25 d. 16 and 24

Remarks: _____
_____.

21. The ratio of two numbers is 3:7. If the sum of the two numbers is 60, what is the value of the smaller number?

- a. **18** b. 24 c. 36 d. 42

Remarks: _____
_____.

22. There are 186 doors and windows in a building. The ratio of doors to window is 1:5. How many doors are there?

- a. 31 b. 155 c. 18 d. 86

Remarks: _____
_____.

23. The ratio of angles of a triangle is 3:4:5. What is the measure of the smaller angle?

- a. 180 **b. 45** c. 60 d. 90

Remarks: _____
_____.

24. The sum of two numbers is 215. If the ratio is 2:3. Find the larger number.

- a. 86 b. 119 **c. 129** d. 96

Remarks: _____
_____.

25. If 4 farmers can plow 3 hectares of land in 6 days, how long will 8 farmers do it?

- a. 1 b. 2 **c. 3** d. 4

Remarks: _____
_____.

26. Twenty painters can paint a building in 10 days. How many painters are needed to paint it in 5 days?

- a. 25 b. 30 c. 35 **d. 40**

Remarks: _____
_____.

27. If 20 men can build a house in 100 days, in how many days can 10 men build the same house in the same conditions?

- a. 150 **b. 200** c. 250 d. 300

Remarks: _____
_____.

28. A stock of food is enough to feed 50 persons in 30 days. How many days will the food last if the number of persons will be doubled?

- a. 5 b. 10 **c. 15** d. 20

Remarks: _____
_____.

29. Mr Fernandez has enough money to pay 10 workers in 30 days. If he adds 5 more workers, how many days can he pay them in the same rate?

- a. 15 **b. 20** c. 25 d. 10

Remarks: _____
_____.

30. Ten schools heads can finish interviewing 200 applicants in 10 days. How long will it take for 20 schools heads to finish the interview for the same number of applicants?

- a. **5** b. 10 c. 15 d. 20

Remarks: _____
_____.

31. When one finds what percent one number is of another, he looks for _____.

- a. Base b. percentage c. rate d. Ratio

Remarks: _____
_____.

32. Finding a number when a percent of it is known means solving for the _____.

- a. Base b. percentage c. proportion d. ration

Remarks: _____
_____.

33. 16 is 25% of 64. The percentage in the problem is _____.

- a. 16 b. 25% c. 64 d. 41

Remarks: _____

34. What is 25% of 20?

- a. **5** b. 10 c. 15 d. 20

Remarks: _____

35. 30% of 600 is what number?

- a. 150 **b. 180** c. 200 d. 400

Remarks: _____

36.60% of 50 is what number?

- a. 20 b. 25 **c. 30** d. 35

Remarks: _____

37. What is 85% of 500?

- a. 125 b. 225 c. 325 **d. 425**

Remarks: _____

38. N is 20% of 1200.

- a. 120 **b. 240** c. 360 d. 480

Remarks: _____

39. is 10% of 1 000 000.

- a. 1000 b. 10 000 **c. 100 000** d. none of the above

Remarks: _____

40. Ricardo got 95% of a 20-item test in Math. How many items did he answer correctly?

- a. 17 b. 18 **c. 19** d. 20

Remarks: _____
_____.

41. What percent of 800 is 400?

- a. **50%** b. 60% c. 75% d. 100%

Remarks: _____
_____.

42. Twenty is what percent of 50?

- a. 25% **b. 40%** c. 60% d. 75%

Remarks: _____
_____.

43. Eighteen is N% of 30. What is the value of N?

- a. 20% b. 40% **c. 60%** d. 80%

Remarks: _____
_____.

44. Out of 50 pupils, only 48 joined the educational trip. What percent joined the trip?

- a. 88% b. 92% c. 94% **d. 96%**

Remarks: _____
_____.

45. Ten pupils of Mrs. Reyes were absent. If there are 50 pupils in the class, what percent of the class is present?

- a. 80% b. 75% c. 90% d. 95%

Remarks: _____
_____.

46. 50% of X is 5. What is the value of X?

- a. 5 b. 50% **c. 10** d. 20

Remarks: _____
_____.

47. 20% of what number is 4?

- a. **20** b. 20% c. 15 d. 30

Remarks: _____
_____.

48. 8 is 20% of what number?

- a. 20 b. 30 **c. 40** d. 50

Remarks: _____
_____.

49. A grade six class went on a field trip. Only 75% or 45 pupils. What is the total enrolment of the class?

- a. 50 **b. 60** c. 70 d. 80

Remarks: _____
_____.

50. Marco has P50 in his purse which is only 50% of the money of his sister. How much is the money of his sister?

- a. P50 b. P75 c. P100 d. P125

Remarks: _____
_____.

II. Solve the following problems carefully. Write your answer on the space before each number.

_____ 51. Lilia has an error of 20% in a 50-item test. How many mistakes does Lilia have in the test?

_____ 52. Maria's allowance is P50 daily. She save 10% of it. How much does she save?

_____ 53. 10% of 120 is what number?

_____ 54. During a sale an item marked P45 was bought for P40. What is the rate of discount?

_____ 55. If a business man sells an item for P5000, he loses P500 cost price, what is the cost price?

_____ 56. If the original price is P200 and rate of discount is 50%. What is the sale price.

_____ 57. Mr. Tolentino bought a barong with 20% discount. How much did he save if the original price is P2000?

_____ 58. Nina bought an arrow dress for 1500 at 20% discount. What is the original price?

_____ 59. The sale price of an item is P1200. If this is 60% lower than the cost, what is the original price?

_____ 60. If a merchant sells an item for P 6500, he losses P300. At what price he sell it to gain 20%?

For item 51-60. Comments/Suggestions or Remarks.

_____.

III. For Item 61-68

Direction: Fill the missing data to complete the table.

TOTAL SALES	RATE OF COMMISSION	COMMISSION	BASIC SALARY	TOTAL INCOME
	20%	P600	P15,200	
	18%	P1,620	P 12, 536	
P120,000	20%			P45,000
P80,000	15%		P15,000	

For item 61-68. Comments/Suggestions or Remarks.

_____.

IV. Directions: Choose your answer from the box below. Write your answer on the space provided before each number.

_____ 69. A lady's bag worth P2000 has a sales tax of 10%. What is the amount of tax?

_____ 70. A television set is marked P 20 000. A tax of 5% is added. What is the total cost of the television?

_____ 71. Mr. Fonda bought a picture frame for P510 exclusive 6% sales tax. How much is the tax?

_____ 72. A sales tax of an item is 420 or 6%. How much is the total cost and the selling price of the item?

_____ 73. Nimz will buy a computer set worth P50, 000 plus 4% sales tax. How much is the total cost?

_____ 74. Nena borrowed P20,000 from a credit union. At the end of 2 years he has to pay 12% interest. How much is the interest?

_____ 75. Ronaldo has P2,000,000 in his savings account. If the rate of interest is 5% a year, how much is the interest after a year?

P200.00	P100,000.00	P52,000.00
P21,000.00	P 2,400.00	P51.00

For item 69-75. Comments/Suggestions or Remarks.

V. **Matching Type.**

Directions: Analyze and solve the problems in column A. Choose the best answer from column B. Write the letter of the correct answer on the space provided before each number.

Lilia invested P 120,000 at 5% simple interest for two years.

- ____ 76. What is the rate of interest? **A. P120, 000**
- ____ 77. The time covered is _____ **B. P126, 000**
- ____ 78. The principal amount is _____ **C. 6,000**
- ____ 79. The amount of interest
- Lilias money earned was _____ **D. 2years**
- ____ 80. Lilia has a total amount
- of _____ in 2 years **E. 10%**

For item 76 -80. Comments/Suggestions or Remarks.

NOTE: TO BE REDUCE TO 50-ITEM TEST ONLY

Prepared by:

NIMROD V. FERNANDEZ
MAT MATH/Researcher

Checked and Validated by:

SIGNATURE OVER PRINTED NAME

APPENDIX F
Table of Specification for the Mathematics Achievement Test

LESSONS	No. of	Numbe	Item	%
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Topics: Ratio, Proportion and Percent

	Days Taught	Number of Items	Placement	
A. Ratio and Proportion				
1. Forming Ratio and Proportion	1	2	1-2	4%
2. Reducing Ratio to Lowest Term	1	3	3-5	6%
3. Finding the Missing Term in a Proportion	1	3	6-8	6%
4. Solving Word problem involving Direct Proportion	2	4	9-12	8%
5. Solving Word problems Involving Partitive Proportion	1	3	13-15	6%
6. Solving Word Problems Involving Inverse Proportion	2	4	16-19	8%
B. Percent				
1. Understanding the Meaning of Percentage , Rate and Base	1	2	20-21	4%
2. Finding the Percentage when Date and Base are given.	1	4	22-25	8%
3. Finding Rate when Percentage and Base are given.	1	4	26-29	8%
4. Finding Base when Percentage and Rate are given.	1	4	30-33	8%
5. Determining Percent of increase/decrease in discounts, original price, rate of discount, sale price and mark up price.	2	4	34-37	8%
6. Determining Commission, rate of commission, total sales and total income.	2	5	38-42	10%
7. Determining Sales tax and selling price.	2	4	43-46	8%
8. Determining Simple interest, principal, rate and time.	2	4	47-50	8%
	20	50	50	100%

APPENDIX G
Mathematics Achievement Test Final Draft

Name: _____

Score: _____

Year and Section: _____

Directions: Encircle the letter of the correct answer.

1. There are 3 cars in a parking lot. If each car has 4 wheels, what is the ratio of cars to wheels?
a. 2:12 b. 3:12 c. 3:4 d. 1:5
2. A bag of chocolate contains Kitkat and Goya. For every 4 Kitkat there are 6 Goya chocolate. If you have 2 Kitkat, how many Goya will you have?
a. 1 b. 2 c. 3 d. 4
3. Which of the following ratios is **NOT** expressed in lowest term?
a. 2:3 b. 4:6 c. 4: 5 d. 7:9
4. What is the lowest term of 18:24?
a. 36:48 b. 9:12 c. 3:4 d. 4:3
5. The following ratios are expressed in lowest term except _____.
a. 1:3 b. 4:7 c. 8:10 d. 11:13
6. What is the value of N in $9:N = 27:15$?
a. 5 b. 10 c. 18 d. 20
7. What is the value of X in $4:7 = X:14$?
a. 4 b. 6 c. 8 d. 10
8. What is the missing term in $N:24 = 11:12$?
a. 12 b. 18 c. 22 d. 36
9. The ratio of two numbers is 3:5. The larger number is 30. What is the smaller number?
a. 12 b. 15 c. 18 d. 21
10. The ratio of areas of two squares is 1:4. The area is smaller square is 12. What is the area of the larger square?

- a. 36 b. 48 c. 60 d. 72
11. A car travels 15 kms on 1 litre of diesel. At the same rate about how far can it travel on 5 litres of diesel?
a. 60kms b. 75kms c. 90kms d. 120kms
12. At the school canteen, 6 pcs of pad paper cost 1 peso, what is the cost of 30 pcs of pad paper?
a. P4.00 b. P5.00 c. P6.00 d. P 7.00
13. Two numbers are in the ratio of 2:3. If the sum is 40, what are the numbers?
a. 12 and 28 b. 24 and 12 c. 15 and 25 d. 16 and 24
14. The ratio of two numbers is 3:7. If the sum of the two numbers is 60, what is the value of the smaller number?
a. 18 b. 24 c. 36 d. 42
15. There are 186 doors and windows in a building. The ratio of doors to window is 1:5. How many doors are there?
a. 31 b. 155 c. 18 d. 86
16. If 4 farmers can plow 3 hectares of land in 6 days, how long will 8 farmers do it?
a. 1 b. 2 c. 3 d. 4
17. Twenty painters can paint a building in 10 days. How many painters are needed to paint it in 5 days?
a. 25 b. 30 c. 35 d. 40
18. If 20 men can build a house in 100 days, in how many days can 10 men build the same house in the same conditions?
a. 150 b. 200 c. 250 d. 300
19. A stock of food is enough to feed 50 persons in 30 days. How many days will the food last if the number of persons will be doubled?

- a. 5 b. 10 c. 15 d. 20
20. Ten of the 40 students in section exodus like mathematics. 10% of the boys like mathematics. What is the base?
- a. 10 b. 10% c. 40 d. all of the above
21. Fifteen of the 50pcs of apples in the basket are rotten. This is 30% of all the apples in the basket. Which is the rate?
- a. 15 b. 50 c. 30% c. 20
22. What is 25% of 20?
- a. 5 b. 10 c. 15 d. 20
23. 30% of 600 is what number?
- a. 150 b. 180 c. 200 d. 400
24. 60% of 50 is what number?
- a. 20 b. 25 c. 30 d. 35
25. What is 120% of 200?
- a. 120 b. 240 c. 320 d. 440
26. Ricardo got 95% of a 20-item test in Math. How many items did he answer correctly?
- a. 17 b. 18 c. 19 d. 20
27. What percent of 800 is 400?
- a. 50% b. 60% c. 75% d. 100%
28. Twenty is what percent of 50?
- a. 25% b. 40% c. 60% d. 75%
29. Out of 50 pupils, only 48 joined the educational trip. What percent joined the trip?
- a. 88% b. 92% c. 94% d. 96%

30. 50% of X is 5. What is the value of X?
a. 5 b. 50% c. 10 d. 20
31. 20% of what number is 4?
a. 20 b. 20% c. 15 d. 30
32. 8 is 20% of what number?
a. 20 b. 30 c. 40 d. 50
33. A grade six class went on a field trip. Only 75% or 45 pupils. What is the total enrolment of the class?
a. 50 b. 60 c. 70 d. 80
34. During a sale an item marked P50 was bought for P40. What is the rate of discount?
a. 10% b. 15% c. 20% d. 25%
35. If a business man sells an item for P4000.00 and he loses P500 cost price, what is the original cost price?
a. P3500 b. P4500 c. P5500 d. P5000
36. If the original price is P200 and rate of discount is 50%. What is the sale price?
a. P50 b. P75 c. P100 d. P150
37. Mr. Tolentino bought a barong with 20% discount. How much did he save if the original price was P2000?
a. P400.00 b. P1600.00 c. P200.00 d. P1800.00
38. Marco sells a wallet worth P1000.00. If he receives P100.00 as his commission, what is the rate of his commission?
a. 10% b. 20% c. 30% d. P40%
39. A salesman sells a brand new car for P1, 000,000.00. If he receives a commission of 20%, how much will be his commission?
a. P20,000 b. P50,000 c. P120,000 d. P200,000

40. A newspaper boy gets P2.00 for every newspaper sold. How much will he get if he sells 50 newspapers?
a. P50 b. P100 c. P120 d. P150
41. Mr. Lopez made P 15,000.00 commission on a sale of P300,000.00 second hand Toyota Fortuner. What was his rate of commission?
a.15% b. 10% c. 5% d. 1%
42. If a lot is sold for P250, 000.00 and the commission rate is P12%, how much will a salesman get as commission?
a. P25,000 b. P30,000 c. P35,000 d. P40,000
43. A lady's bag worth P2000 has a sales tax of 10%. What is the amount of tax?
a. P100 b. P200 c. P300 d. P400
44. A television set is marked P 20 000. A tax of 5% is added. What is the total cost of the television?
a. P25, 000 b. P22,500 c. P21,000 d. P19,000
45. Mr. Fonda bought a picture frame for P510 exclusive 15% sales tax. How much is the tax?
a. P51 b. P76.50 c. P120 d. P153
46. Leo will buy a computer set worth P50, 000 plus 4% sales tax. How much is the total cost?
a. P54,000 b. P53,000 c. P52,000 d. P51,000
47. Nena borrowed P20, 000 from a credit union. At the end of 2 years he has to pay 12% interest. How much is the interest?
a. P1,200 b. P2,000 c. P2,400 d. P3,000

48. Marie has put P125, 000.00 in time deposit in a bank. If the bank gives 19% interest for 2 years, what is the rate of interest per year?
a. 19% b. 9.5% c. 5% d. None of the above
49. Nilia invested P 100,000.00 at 5% simple interest. She receive P10,000.00 after a period of time. What is the time covered for her investment?
a. 1 year b. 2 years c. 3 years d. 4 years
50. Roland has P20,000.00 in his savings account. If the rate of interest is 5% a year, how much interest does his money earn after a year?
a. P500 b. P1,000 c. P1,500 d. P2000

APPENDIX H
The Mathematics Attitude Scale

OPTIONAL:

Name: _____ Grade and Section: _____

DIRECTIONS: This is not a test. There are no right or wrong answers. We would like to know how you feel about the following statement. Please Put Check (✓) on the blank corresponding to your reaction. Please try to be honest and sincere as you can. Thank you.

Legend:

4	SA – Strongly Agree
3	A – Agree
2	D - Disagree
1	SD – Strongly Disagree

STATEMENTS	SA (4)	A (3)	D (2)	SD (1)
1. I find the lessons in mathematics very challenging.				
2. I am always afraid in a mathematics class.				
3. I am interested in learning mathematics.				
4. I like mathematics subjects because I learn a lot from them.				
5. A mathematics subject is fun for me.				
6. I find mathematics reward useful indifferent situations.				
7. I feel insecure whenever I study mathematics.				
8. I feel confident because of mathematics.				
9. I feel that topics I learn in mathematics will not be useful to me in the future.				
10. I find mathematics a boring subject.				
11. I feel uncomfortable, and impatient in mathematics activities.				
12. I feel good in mathematics games.				
13. Mathematics makes me feel irritable.				
14. When I hear the word mathematics, I have the feeling of dislike.				
15. I feel nervous when solving mathematics word problems.				
16. I don't recite in a mathematics class because I might be ridiculed if I give the wrong answer.				
17. I am confident that I can get good grade in mathematics because I study it very hard.				
18. I am happier in a mathematics class than any other subjects.				
19. I feel at ease in mathematics lessons.				

20. I am not comfortable when working with others on mathematics exercises.				
21. I feel comfortable with numbers and symbols.				
22. I cannot think well every time my teacher discusses numbers and symbols.				
23. I am unable to think clearly in my mathematics class				
24. I believe that learning mathematics well will help me earn a living.				
25. I feel upset with mathematics activities.				
26. I like to talk to my mathematics teacher about career that involve math.				
27. I always believe that mathematics is very important subject.				
28. I believe I cannot do well in mathematics.				
29. I feel disappointed because mathematics has been my difficult subject.				

APPENDIX I
The Mathematics Enthusiasm Scale

OPTIONAL:

Name: _____ Grade and Section: _____

DIRECTIONS: This is not a test. There are no right or wrong answers. We would like to know how you feel about the following statement. Please put check (✓) on the blank corresponding to your reaction. Please try to be honest and sincere as you can. Thank you.

Legend:

4	SA – Strongly Agree
3	A – Agree
2	D - Disagree
1	SD – Strongly Disagree

STATEMENTS	SA (4)	A (3)	D (2)	SD (1)
1. I like attending mathematics class because it is fun and enjoyable				
2. I don't like to participate actively in mathematics discussions.				
3. I always like to come to school because of mathematics.				
4. I am always excited in the different games in mathematics.				
5. I am always eager to get along with my classmates in mathematics class.				
6. I don't like most of the mathematics outdoor activities we have taken in the school.				
7. I am not eager to join outdoor activities in mathematics.				
8. I am always energetic because of my mathematics class.				
9. I feel excited to do math tasks.				
10. I want to listen carefully to my mathematics teacher.				
11. I am not willing to discuss mathematics assignments with my classmates.				
12. I don't like to participate in mathematics group activities.				
13. It is always in my mind to become successful mathematicians someday.				
14. I would willingly exchange mathematics subject for an easier subject in school.				
15. I want to get along with my classmates most especially in mathematics group discussions.				

16. I don't like to handle more lessons in mathematics.				
17. I look forward to every new activity in mathematics.				
18. If I have a choice I will not take mathematics subjects in the elementary level.				
19. I always prepare myself in mathematics lessons.				
20. I always want to do mathematics assignment given by the teacher.				
21. I never liked mathematics.				
22. I am not interested in the majority of the lessons in mathematics.				
23. I know I cannot do well in mathematics.				
24. I am always interested in mathematics group games.				
25. I always want to act as leader mathematics class.				
26. I am not excited to come to school every day because of my mathematics class.				
27. I always give up solving word problems in mathematics.				
28. I am always alert during recitations in my mathematics class.				
29. I am not interested in studying numbers and symbols.				
30. I am not eager to discuss mathematics activities with my classmates.				

APPENDIX J

Comparison of Age and Grades in the First Quarter and Second Quarter of the Experimental Group and Control Group

Student No	EXPERIMENTAL GROUP			CONTROL GROUP		
	Age	1 st Grading	2 nd Grading	Age	1 st Grading	2 nd Grading

1.	11	87	87	11	87	88
2.	12	86	87	11	86	87
3.	12	86	86	12	86	87
4.	11	85	87	11	86	86
5.	10	85	85	11	85	86
6.	12	84	86	11	85	86
7.	12	84	85	12	84	85
8.	13	82	85	13	83	84
9.	11	83	84	11	83	83
10.	11	83	83	11	83	83
11.	12	83	83	12	82	84
12.	12	81	83	11	81	83
13.	10	83	83	10	82	83
14.	12	82	82	12	81	82
15.	11	82	82	11	81	83
16.	11	81	82	11	81	82
17.	11	80	81	11	80	81
18.	12	81	81	12	80	81
19.	12	80	80	11	80	81
20.	11	79	80	11	79	80
21.	11	79	80	12	79	80
22.	13	79	80	11	79	79
23.	13	79	79	13	79	79
24.	11	79	79	11	79	79
25.	11	78	79	11	78	79
26.	12	78	78	12	78	79
27.	12	78	78	12	78	79
28.	13	78	79	14	78	78
29.	13	77	78	12	78	78
30.	13	77	78	13	77	78
31.	12	77	78	12	77	78
32.	11	77	78	11	77	78
33.	11	77	77	11	76	77
34.	11	76	77	12	76	77
35.	12	75	75	12	75	76
Total	408	2820	2846	405	2819	2849
Mean	11.66	80.57	81.31	11.57	80.54	81.40

APPENDIX K

Statistical Computation

T-Test

[DataSet1] C:\Users\kristine\Documents\Nimrod.sav

Group Statistics

	group	N	Mean	Std. Deviation	Std. Error Mean
preattitude	E	35	2.8670	.28425	.04805
	C	35	3.0552	.37432	.06327
postattitude	E	35	3.2448	.28889	.04883
	C	35	3.0610	.33602	.05680
preenthusiasm	E	35	2.9010	.25185	.04257

Independent Samples Test

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
preattitude	Equal variances assumed	.021	-.18818	.07945
	Equal variances not assumed	.021	-.18818	.07945
postattitude	Equal variances assumed	.017	.18381	.07490
	Equal variances not assumed	.017	.18381	.07490
preenthusiasm	Equal variances assumed	.000	.43619	.05311

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
pretest	Equal variances assumed	8.408	.005	-.756	68
	Equal variances not assumed			-.756	58.267
posttest	Equal variances assumed	.630	.430	-.050	68
	Equal variances not assumed			-.050	67.941

T-Test Experimental

[DataSet1] C:\Users\kristine\Documents\Nimrod.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	preattitude	2.8670	35	.28425	.04805
	postattitude	3.2448	35	.28889	.04883
Pair 2	preenthusiasm	2.9010	35	.25185	.04257
	postenthusiasm	3.3562	35	.30719	.05192
Pair 3	pretest	19.8571	35	4.25747	.71964
	posttest	26.66	35	7.211	1.219

T-Test Control

[DataSet1] C:\Users\kristine\Documents\Nimrod.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	preattitude	3.0552	35	.37432	.06327
	postattitude	3.0610	35	.33602	.05680
Pair 2	preenthusiasm	2.4648	35	.18786	.03175
	postenthusiasm	2.4676	35	.25068	.04237
Pair 3	pretest	20.8571	35	6.57152	1.11079
	posttest	26.74	35	7.001	1.183

Paired Samples Correlations

Reliability

[DataSet0]

Scale: Enthusiasm Scale**Case Processing Summary**

		N	%
Cases	Valid	80	100.0
	Excluded ^a	0	.0
	Total	80	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items

Item Statistics

	Mean	Std. Deviation	N
VAR00001	3.3000	.60379	80
VAR00002	3.1500	.79715	80
VAR00003	2.9625	.60470	80
VAR00004	3.4875	.57355	80
VAR00005	2.6125	.66549	80
VAR00006	3.0875	.64029	80
VAR00007	2.9250	.91090	80
VAR00008	3.1625	.60470	80
VAR00009	3.1875	.59733	80
VAR00010	3.3000	.68251	80
VAR00011	3.0375	.78666	80
VAR00012	3.3625	.71589	80
VAR00013	3.1250	.71821	80
VAR00014	2.6125	.73766	80
VAR00015	2.8750	.84756	80
VAR00016	3.1750	.68943	80
VAR00017	3.0625	.69980	80
VAR00018	3.1500	.71334	80
VAR00019	3.3625	.67961	80
VAR00020	3.2250	.59481	80
VAR00021	3.2500	.80347	80
VAR00022	3.1500	.78111	80
VAR00023	2.7625	.71589	80
VAR00024	3.4500	.65410	80
VAR00025	2.7250	.85647	80
VAR00026	3.2250	.77908	80
VAR00027	2.7625	.78343	80
VAR00028	3.0000	.72914	80
VAR00029	3.1250	.80150	80
VAR00030	2.8000	.84793	80

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VAR00001	89.1125	65.038	.271	.790
VAR00002	89.2625	62.880	.358	.786
VAR00003	89.4500	65.947	.176	.793
VAR00004	88.9250	63.235	.491	.782
VAR00005	89.8000	66.339	.116	.796
VAR00006	89.3250	65.665	.190	.793
VAR00007	89.4875	63.266	.272	.791
VAR00008	89.2500	62.873	.501	.781
VAR00009	89.2250	63.468	.443	.784
VAR00010	89.1125	64.456	.285	.789

Reliability

Scale: attitude

Case Processing Summary

		N	%
Cases	Valid	80	100.0
	Excluded ^a	0	.0
	Total	80	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.797	30

Item Statistics

	Mean	Std. Deviation	N
VAR00001	3.2000	.64435	80
VAR00002	2.9500	.57147	80
VAR00003	3.4250	.65168	80
VAR00004	3.2875	.62020	80
VAR00005	3.1000	.70442	80
VAR00006	2.8500	.59746	80
VAR00007	2.6875	.70430	80
VAR00008	2.9000	.68621	80
VAR00009	3.0875	.87430	80
VAR00010	3.3250	.68943	80
VAR00011	2.7750	.87113	80
VAR00012	3.3625	.64128	80
VAR00013	2.7875	.86703	80
VAR00014	2.9875	.81898	80
VAR00015	2.5625	.76048	80
VAR00016	2.8250	.72522	80
VAR00017	2.9750	.67458	80
VAR00018	2.6625	.67400	80
VAR00019	2.7500	.62642	80
VAR00020	3.0125	.62630	80
VAR00021	3.0500	.69172	80
VAR00022	2.8000	.70081	80
VAR00023	2.7000	.76968	80
VAR00024	3.3375	.67400	80
VAR00025	2.7250	.71112	80
VAR00026	2.7250	.72871	80
VAR00027	3.3875	.70250	80
VAR00028	2.9375	.80101	80
VAR00029	2.9375	.71766	80
VAR00030	2.8875	.79546	80

Item-Total Statistics

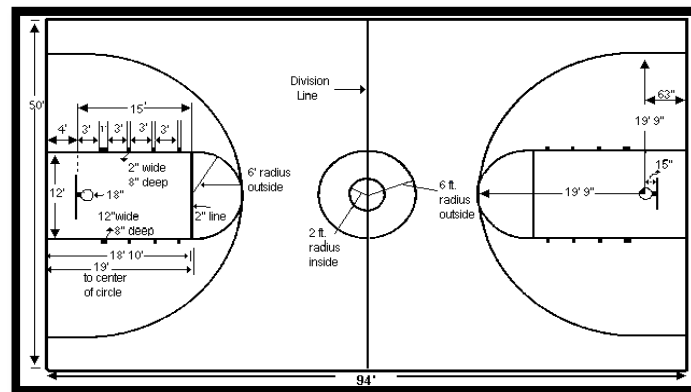
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VAR00001	85.8000	63.251	.312	.791
VAR00002	86.0500	63.643	.317	.791
VAR00003	85.5750	62.703	.362	.789
VAR00004	85.7125	62.258	.431	.787
VAR00005	85.9000	62.825	.317	.791
VAR00006	86.1500	63.091	.360	.790
VAR00007	86.3125	65.661	.062	.802
VAR00008	86.1000	63.104	.301	.792
VAR00009	85.8125	69.700	.220	.795

APPENDIX L
Outdoor Mathematics Activities

Outdoor Activity Number 1

Topic: Forming Ratio and Proportion

Group 4



Preliminary Activities

Pupils will be divided into 4 groups. Ask the pupils to prepare their measuring materials and ballpen and paper per group. Assign each group to their respective court to measure. Let the pupils realize the importance of cooperation during activities.

Learning Activities:

1. Measure the Lengths, widths, centreline, and other parts of the court assign to your group.
2. Analyse and compare the measurement of each part.
3. Form the ratio using the measurement the following parts:
 - a. Length to width and vice versa
 - b. Area of the whole court compare to the area of the half court?
 - c. Measurement of the centerline and the Length.
 - d. For group 1 measure the area of doubles compare to single. Form ratio and proportion using the data.
 - e. For group 2 compare the radius/diameter of the service center to the radius/diameter of the semi-circle.
 - f. Compare the measurement of the court assigned to your group to other three courts.

G. Form proportion using the measurement of each part.

PAIR ACTIVITY

PROCEDURE:

1. Get your partner. Prepare 1 whole sheet of pad paper and pencil.
2. Form at least 5 ratios and proportion of the different school facilities like buildings, no of rooms per building, the covered court, libraries, etc.
3. You may also use the school population is forming ratio and proportion.

BOYS – KINDER TO GRADE III BUILDING

GIRLS – INTERMEDIATE BUILDINGS AND COVERED COURT

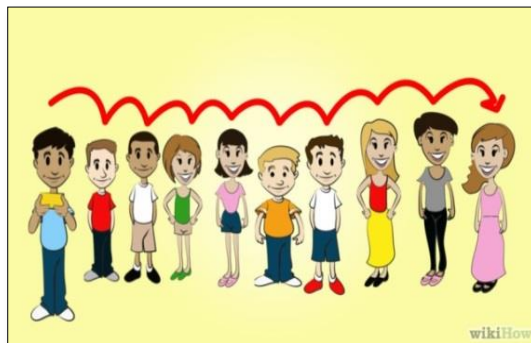
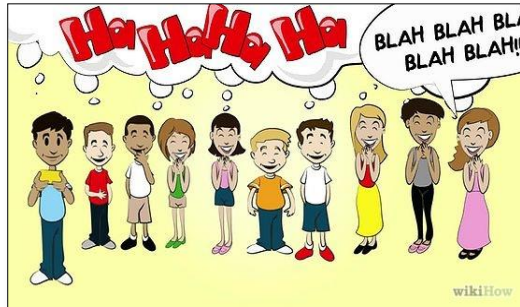
Observations:

Outdoor Activity Number 2

Topic: Reducing Ratio to Lowest Term
Reference: BEC PELC II.K.1.1 – 1.1.1
Materials: Concrete objects, flash cards, cut-outs

PRESENTATION:

PASS THE LOWEST TERM



Preliminary Activities

Pupils will be group into 4. Each group will be given 5 minutes to review the previous lesson and other lessons related to reducing ratio in lowest term. Have brain storming before the games. Let them realize the importance of teamwork and discipline for them to win the game.

Learning Activities:

1. The participants are divided into 4 groups and each group forms a line.
2. The person in front will be given a ratio to be reduced in lowest term and must pass the correct answer to the next person.
3. The last person at the back will write the correct answer in the board placed in the stage. If the answer is correct, their group will be given 2 points. The goal is to get the message relayed to the last person intact and without any changes.

Note: In case the student in front do not know the answer, he/she is free to ask the next group mate.

4. The first group to earn 10 points will be declaring the winner.

A. Group Activity

WHAT IS THE HIDDEN WORD?

Reduce the following ratio to lowest term. Choose the letter that corresponds to the ratio of lowest term.

$$E = 3:4$$

$$I = 1:2$$

$$R = 2:9$$

$$T = 15:4$$

$$G = 1:6$$

$$N = 5:6$$

$$S = 1:4$$

8:16	30:36	30:8	18:24	6:2	30:40	10:40	60:16	5:10	25:36	5:30

B. Individual Activity

- A. Express the given ratio in simplest or lowest terms.
 1. 10 hours to 24 hours
 2. 2 hours to 1 day

3. 50 centavos to 5 pesos
4. 1 dozen to 24 pcs of things
5. 1500 kms to 5 hours
6. 45 boys to 50 girls
7. 1 km to 500 meters
8. 30 apples to 45 mangoes
9. 30 cm to 1 meter
10. 300 kms to 10 liters of gasoline

Observations:

[illegible]

Outdoor Activity Number 3

Topic: Finding Missing Term in a Proportion
References: BEC PELC II.K.1.2
Materials: Balloons, marker, flash cards, picture

PRESENTATION:

NUMBER SPLASH: A WATER BALLOON PROPORTION GAME



Preliminary Activities

Divide the pupils into groups. Each group will be given 10 minutes to read the topic about missing term in a proportion and another 5 minutes to discuss among themselves. Teacher must see to it that everyone understands the process of finding the missing term. Let them realize the importance of coordination and mastery of the topics in order to win.

Learning Activities:

1. Participants are divided into 5 groups and each group forms a line.
2. Teacher will show proportion with missing term using show me board or flashcards.

3. Each group will solve the problem, and then the person in front will run to the balloon containers to get the balloon containing correct missing term and pop it immediately.

“WHAT IS THE MISSING TERM TRAIL”

Mechanics:

1. Teacher will be posting 10 printed word problems in different parts of the school campus. Each group must answer each problem all together. The first group to finish answering the problems will be given 20 points, 2nd group 19 points, the 3rd group will have 18, 4th group will have 17 points and the last group to finish will earn 16 points.
2. Two points will be deducted to the group in every wrong answer in each item.

A. Individual Activity

Solve for the missing term in each proportion.

1. $2:n = 8:12$
2. $X:5 = 6:30$
3. $40:48 = N:6$
4. $Z : 6 = 30:60$
5. $28:42 = 4:N$

Outdoor Activity Number 4

Topic: Direct Proportion
Reference: BEC PELC II.K.2.2.1
Materials: Flash Cards, Printed Word Problems, Chart
(Physical Education Integration)

PRESENTATION:

FORM THE NUMBER



Preliminary Activities

A day before the activity, pupils will be divided into groups. Let them study solving word problems involving direct proportion. Teacher will also share some tips in order to solve each problem quickly. There should be at least 15 minutes for class discussion before the activity. Let the pupils

practice the process of forming their body into numbers a day before the activity.

Learning Activities:

1. Arrange everyone into teams of 6. Have the team elect one person to be the leader of the team.
2. Teacher will read twice the word problems involving direct proportions. Each group must answer it quickly.
3. Teams rearrange themselves to the number that corresponds to the correct answer. The leaders can help rearrange them to their appropriate positions. Once the team rearranges themselves, they have to raise their hands and stand in place.
4. The first team to arrange themselves correctly receives 2 points. The team that reaches 10 points wins the game.

Remember:

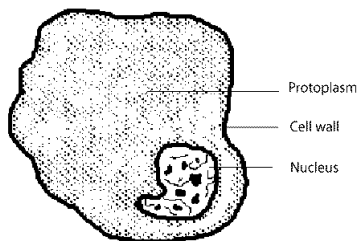
Work as a team to display the numbers as quickly as possible. Solve the problem quickly, and then show the answer by forming themselves into number form.

Observations:

Outdoor Activity Number 5

Topic: Partitive proportion
Reference: BEC PELC II.K.2.2.2
Materials: String, Printed Word Problems, chart
(Science Integration)

Amoeba Trail



Preliminary Activities

Students will be divided into groups. Teacher should discuss what amoeba is. Let the pupils realize the importance of coordination and cooperation of each member. A day before the game, ask the pupils to study solving word problems involving partitive proportion. Have group meeting and review a day before the activity.

Learning Activities:

1. Students will form into 1 big group. Teacher will explain how to create an amoeba.

There are 3 parts:

a. a lot of protoplasm -(people who don't mind being close, gather together)

- b. a cell wall - (people who like to contain themselves & others, surround the protoplasm, facing outward, linking elbows)
- c. a nucleus-(someone with good eyesight and the ability to keep on top of things should be the nucleus, seated on the shoulders of some of the protoplasm)

2. Once the amoeba is formed, they have walked in front of the stage and try to listen to the teacher on how to solve word problems involving partitive proportion. Students in amoeba group will proceed to other side of the court to look for other example on how to solve the word problems.

3. Finally, try a little cell division. The entire group will be Split into three, create a second nucleus and have an Amoeba Race where each amoeba group have to answer 5 problems posted in the different parts of the covered court.

A. Pair Activity

Directions: Read, Analyse and solve the problems posted in the mango trees.

1. The salary of the two workers is in the ratio of 5:6. If they receive P 33,000.00 How much did each worker receive?
2. Two numbers is in the ratio of 3:6. If the sum of two numbers is 200, what are the two numbers?
3. The ratio of cats and dogs is 1:3. There are 20000 cats and dogs in the city of Santa Rosa. How many cats are there? How many dogs are there?
4. A string is divided into 3 parts which is in the ratio of 1:2:3. How long is the smallest string if the sum is 150 meters?
5. The difference of two numbers is 10. They are in the ratio of 4:5. What are the numbers?

Observations:

Outdoor Activity Number 6

Topic: Inverse Proportion
Reference: BEC PELC II.K.2.2.3
Materials: 30pcs of Pots, Garden Soil, Gardening materials, Chart and Printed word Problems.

VEGETABLE POT GARDENING



GROUP	I	II	III	IV	V	VI
No. of Members	2	4	6	8	10	12
No. of Pot to be planted	5	5	5	5	5	5

Preliminary Activities

Prepare all the vegetable seedlings and pots before the activity. Have the pupils realize the importance of planting vegetables. Let the pupils recite the usage of each gardening tools.

Procedures:

1. Students will be divided into 6 groups. Members of each group will not be equal but they have to plant vegetable on the same number of pots.
2. Let the students realized that the more the members in each group, the less time needed to finish the assigned task.
3. The entire class will have brain storming after the vegetable planting. Let them discover the process on how to solve word problems involving inverse proportion.

APPLICATION:**PAIR BRAIN STORMING**

Analyze and Solve the Problems

1. I have enough money to have a vacation of 15 days if I spend P 500 a day. For how many days will my money last if I decide to spend only P 400 a day?
2. 10 sewers can finish 200 children's dresses in in 10 days. How many days will it take 15 sewers to finish the same job?
3. A stock of food is enough to feed 70 persons in 20 days. How many days will the food last if 30 more persons will be added?

Observation:

Outdoor Activity Number 7

Topic: Meaning of Percentage, Rate and Base
Reference: PELC II.L.1.1, 1.2, 1.3 AND 2
Materials: 20 pebbles for each pair of pupils,
 and 2 pcs of Coupon bond.
(EPP and Science Integration)

Planting Time



Preliminary Activities

1. Prepare the materials needed in vegetable gardening.
2. The teacher should discuss the importance of nutritional value of vegetables. Let the pupils realized that planting vegetable will make them healthier.
3. The teacher should also discuss the proper way of planting vegetable seeds.

Learning Activities

Nicko has 20 okra seeds. He gives 5 okra seeds to his partner for him to plant in the vegetable garden.

Procedures:

1. Group the pupils by pairs.
2. Each pair will divide 20 vegetable seed for them to plant it in the vegetable garden.

3. After the planting activity teacher will be asking each pair who planted more seeds and who planted less number of seeds.
4. Have the pupils talk about the activity and analyse the number of seeds they planted compare to the total number of seeds which is 20.
5. Let each pair of pupils express in fraction form the number of seeds they planted in relation to the total number of seeds. Change the fraction form to percent.
6. Ask them what part of the total number of seeds in each describing the number of seeds that each pupil planted. Let them create table that will show that number of seeds they planted.
7. Have each pair of pupils identify the rate, base and percentage using the data in the table. Using the Techan's Triangle, ask them to determine the rate, base and percentage.

SAMPLE TABLE FOR EACH PAIR

	Ana	Annie	TOTAL NUMBER OF SEEDS
Number of Seeds	12	8	20
Percentage	60%	40%	100%

Observation:

Outdoor Activity Number 8

Topic: Finding Percentage when the Rate and Base are given
Reference: BEC PELC II L 3.2.1 AND 3.1
Materials: Paper bag or Grocery Bag, Manila paper and Marker
(Science Integration)

COMMUNITY FIELD TRIP



Preparatory Activities:

Teacher should discuss first the importance of community field trip to the pupils. Let the pupils realize the significance of trees and other types of plants in maintaining balance in the ecosystem. Teacher must also discuss why plants have different kinds of leaves and flowers.

Learning Activities:

1. Students will be divided into five groups.
2. Assign a leader in each group that will take in charge to the discipline of the members during community tour.

3. Pupils in each group will collect different kinds of leaves that they will see in the community. 1 leaf per plant only. Minimum of 30 different types of leaves is required for each group.

4. After the tour, each group will classify the leaves according to type of plants. (Grass, Trees, shrubs, vines etc.).

5. Every group will create table as shown below.

6. Compute for the percentage of the different type of leaves they gathered during the community trip.

Types of plants	Leaves	No. of Leaves	Percentage
Trees			
Shrubs			
vines			
grass			
herbs			
Total			

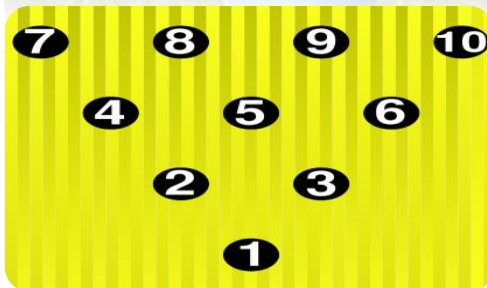
Observations:

[illegible]

Outdoor Activity Number 9

Topic: Finding the Rate when the Percentage and Based are given
Reference: BEC PELC II.L.3.2.2 and 3.1
Materials: (5)10pcs of 1.5L coke container
 5 volleyball balls or basketball balls

Bowling Time



Points of every pin knock down



mode of competition

Preliminary Activities

Students will be given 10 minutes to study the process of finding rate when percentage and base are given and another 5 minutes for group discussion. Each group will be asked by the teacher about finding the rate and let them explain the process in front of the other groups.

During discussion, let the pupils realize the positive effects of sports in our health.

PROCEDURE:

1. Students will be divided into groups with six members each.
2. Each member will have a chance to knock down all bowling pins twice.
3. Points will be recorded in the score sheets. Each group will compute for the rate of the knock down pins.
4. The total points and total rate of points will be computed. Ranking will be based on the total rates of knock down pins. Perfect rate will be 1800%.
5. Competition will be a single elimination round.

MEMBERS	TOTAL POINTS OF 10 PINS	TOTAL POINTS OF THE KNOCK DOWN PINS			RATE OF POINTS FOR THE KNOCK DOWN PINS		
		1st	2nd	total	1st	2nd	total
1	55						
2	55						
3	55						
4	55						
5	55						
6	55						
TOTAL	330						

Observations: _____

_____.

Outdoor Activity Number 10

Topic: Finding the Base when the Percentage and Rate are given
Reference: BEC PELC II.L.3.2.3
Materials: Word Problems, Answer Sheets.

The Caterpillar Mathematics Trail



PROCEDURES:

1. Students will be divided into groups with 5 members in each group.
2. Each group will be name using the names of the different mathematicians. (e.g. Pythagoras, Euclid etc.)
3. Each group will be given answer sheets for them to write the correct answers.

4. Participants will form a caterpillar like line by simple touching or holding the shoulder of his group mate in front of him. They have to see to it that the caterpillar formation will not be disorganized during the activity.
5. Two points will be deducted in every group every time their formation will be cut during the activity.
6. The teacher will give signal to start the caterpillar mathematics trails.
7. Groups will have to find for the different problems posted in different parts of school campus. All members of each group should participate in solving problems. 5 points will be given to each in every correct answer. There are 20 word problems to answer.
8. Class discussion is necessary after the activity. 2 points will be given to the group that will solve for the correct answer in front of his classmates.

WORD PROBLEMS IN CATERPILLAR MATHEMATICS TRAIL

	<i>Word Problems</i>		<i>Word Problems</i>
1.	88% of what number is 660?	11.	12% of what number is 60?
2.	Lola Tidora soends P5000 in the grocery for their weekly consumption or 25% of her monthly salary. How much is her monthly salary?	12.	A gold watch was bought for P2000. If the price included a 20% gain, what was the cost price of the watch?
3.	Pinoy receives P150 from her mother as allowance which is 50% of the money he receives from his father. How much does his father give him?	13.	A second hand motorcycle was sold at P20 000.00. If this is 40% of the brand new price, how much is the brand new price?
4.	Lilia gets 90% of the science exam correctly which is 45. How many items does the test have?	14.	In a grade 6 outing only 40 students participated. If 40% of the grade six students joined the outing, how many grade six students are there in the school?
5.	A grade six class went on a field trip. Only 70% or 35 pupils joined the activity.	15.	A diet ice cream contains 60% fewer calories than a regular ice cream. If the diet ice-cream contains 140 calories, how many calories does a serving of regular ice-cream contain?

Outdoor Activity Number 11

Topic: Discounts, Original Price,
Rate of Discount, Sale Price and Mark Price.
Reference: BEC PELC 3.3 3.4 and 3.4.1
Materials: Play money, Used Clothes, shoes, bags etc.

Interview with our Grand Parents



Procedures:

1. Students will be divided into groups with maximum of 5 members in each group.
2. Assigned leader and secretary in each group.
3. Each group will have to interview at least one grandparent or elder which is 60 years old and above.

4. Asked the following questions during interview.

- Basic profile of the respondents. (Name, age, address).
- What is the main purpose of the senior citizen ID?
- What are the different benefits of a senior citizen?
- How much discount is given to senior citizen? (Let them given examples of prices and cost of discounts.
- How will you know if the amount of discount is properly deducted from the original price of items?

Note: Questions will be translated using the mother tongue language.

5. Group brain storming and presentation will be done after the interview.

6. Answers of senior citizen will be written on the cartolina for group presentation.

7. Proper documentation is required in each group. (e.g. pictures).

Observations:

[illegible]

Outdoor Activity Number 12

Topic: Commission, Rate of Commission, Total Sales and Total Income
Reference: BEC PELC L. 3.4.2
Materials: Slice bread, sandwich spread, lettuce, cucumber Tomatoes, apron, tissue paper etc.

Sandwich Making



Procedures:

1. Students will be divided into 4 groups with equal number of members in each group.
2. Assign a leader in each group. The leader must assign who will be the seller, members who will make sandwich and other members will assist while making the sandwich.

3. Each group will make a minimum of 10 sandwiches and maximum of 15 sandwiches per group.
4. They have to sell it to the teachers and students in the school campus with permit letter from the school head. A certain rate of commission will be given to the members of each group.
5. After the activity, all groups must complete the table transparency on the stage.
6. Group discussion and brain storming will be done to identify the groups that have a highest gain and who are the groups lost their profit in the activity.

TABLE OF TRANSPARENCY

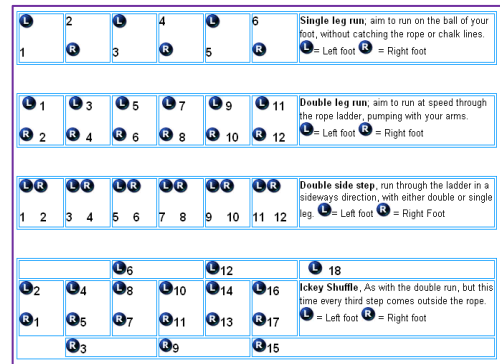
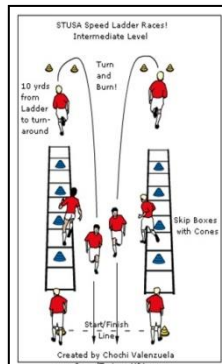
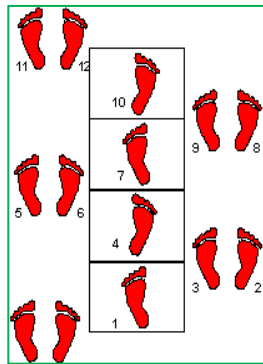
Groups	Sandwich Flavour	Price per Piece	Commission	Rate of Commission	Total Sales	Total Income
A	Tuna					
B	Egg					
C	Chicken					
D	Bacon					
TOTAL						

Observation:

Outdoor Activity Number 13

Topic: Sales – Tax and Selling Price
Reference: BEC PELC 3.4.3
Materials: 2 ladders 10 meters long
(Physical Education Integration)

Complete the Table Ladder Race *(Boys vs Girls)*



Sample Table to Complete the Data

Selling Price	Rate of Sales Tax	Sales Tax	Total Cost
P5500.00	6%		
P2900.00	8%		
		P800.00	P10400.00
P6000.00		P600.00	
P12500.00		P3000.00	
	10%	P300.00	
	15%	P 450	

P12000.00			P15000.00
P360			P400
P550.00	12%		
		P1500.00	P12000.00

Procedures:

1. This game will be boys vs girls. Participants are divided into two groups separating boys from girls.
2. Each group will form a line, in front of each group will be at least 2 ladders used in training drills of different sports event. The ladder should at least 9 meters long or must have a minimum of 30 steps.
3. Posted on the stage are table about selling price, Rate of sale, Sales tax and Total cost with missing data. Tables are printed in tarp-papel at 18" x 24" in size.
4. To start the activity, the teacher will show how to execute at least 5 ladder drills that each participant will do.
5. Teacher will give signal to start the game. The student in front must execute properly the ladder drills before he can answer the missing data.
6. In returning back to line, participant must execute again the ladder drills. Each group must complete the data in the tarpapel.
7. The first group to complete the missing data will be declaring as winner.

Reminders: *Teacher must remind the pupils about safety tips while executing the drills. He should also tell them the benefits of the ladder drills and side effects of it after the activity.*

Activity 2

Group Discussion

Let the pupils bring official receipt from electric or water bills or even OR from grocery stores. Write in 1 whole cartolina per group the selling price, rate of tax, sales tax and total cost for every official receipt.

Observation:

Outdoor Activity Number 14

Topic: Simple Interest, Principal, Rate and Time
Reference: BEC PELC L.3.4.4

The Amazing Obstacle Interest Race



Sample Obstacle Map

Procedures:

6. Let the pupils to have their pair in this amazing obstacle race.
7. Everybody must see first the obstacle map posted outside.
8. In every obstacle course, there are problems to solve before they can proceed to the next obstacle.

Appendix M

Daily Log Lesson (DLL Plan) for the Experimental Group

<i>Days</i>			
Competency	Form Ratio and Proportion	Reduce Ratio to Lowest Term	Find the missing Term in a Proportion
Subject Matter	Forming Ratio and Proportion	Reducing Ratio to lowest term	Finding the missing in a proportion
Learning Procedures			
Activity	Measuring the actual length, width, and are of badminton court, sepak takraw court, volleyball court and basketball court.	Pass the lowest term	Number Splash
Analysis	What is ratio? Proportion? How will you form ratio and proportion using the measurement of sports facilities?	How will you reduce ratios to lowest term? What are the different ways to write the lowest term?	What is proportion? What are the terms or elements in a proportion?
Abstraction	What are the 2 ways of writing ratio and proportion?	Can a ratio express in lowest term?	How do we find missing element in proportion?
Application	Form at least 10 Ratio and proportion using	Message relay – solve for the lowest term then past the message to your groupmates.	Math Trail Solving word problems posted in different parts of the school
References	BEC PELC II.K.1.1, 1.1.1	BEC PELC II.K.1.1-1.1.1	BEC PELC II.K.1.2

<i>Days</i>			
Competency	Solving Word Problems Involving Direct Proportion	Solving Word Problems Involving Partitive Proportion	Solving Word Problems Involving Inverse Proportion
Subject Matter	Solve Word Problems Involving Direct Proportion	Solve Word Problems Involving Partitive Proportion	Solve Word Problems Involving Inverse Proportion
Learning Procedures			
Activity	Outdoor discussion Solving word problems Brain storming about direct proportion	Fruit Sharing	Vegetable Pot Gardening (seedlings)
Analysis	What is direct proportion?	What will you do if you will share 1 banana to your 3 classmates? What are the processes involve in solving word problems involving partitive proportion?	What happen to the group with lesser number of members? What group was able to finish first their assign task?
Abstraction	How do we solve word problems involving direct proportion?	How do we solve word problems involving partitive proportion?	How do we solve for an inverse proportion?
Application	Form the number (see Activity No. 4)	Amoeba Trail	Pair Activity Solving word problems involving inverse proportion (see activity 6)
References	BEC PELC II.K.2.2.1	BEC PELC K.2.2.2	BEC PELC II.K.2.2.3

<i>Days</i>			
Competency	Meaning of percentage base and rate	Finding the percentage when rate and base are given	Finding the rate when percentage and base are given
Subject Matter	Meaning of percentage base and rate	Find the percentage when rate and base are given	Find the rate when percentage and base are given
Learning Procedures			
Activity	NGP activity Vegetable planting (seeds)	Community Field Trip	Bowling Time
Analysis	How many seeds did you plant in the garden? How many percent of the seeds did you plant?	What are the different kinds of leaves you collected? How many leaves were able to gather?	How did you compute for your total score in order to win? What is the maximum score in order to qualify for the final round?
Abstraction	What is percentage? Base? Rate?	How do you find percentage when the rate and base are given?	How do you find rate when percentage and base are given?
Application	(Pair Activity) Solving word problems) Identifying the percentage, base and rate in the problem.	Froggy Math Trail Finding percentage	Game Kanaba ? Atras Abante Finding the rate
References	BEC PELC II.L.1.1,1.2,1.3 and 2	BEC PELC II.L 3.2.1 and 3.1	BEC PELC II.L.3.2.2 and 3.1

<i>Days</i>			
Competency	Finding the base when percentage and rate are given	Mental computation of percentage	Solving Word problems involving discount
Subject Matter	Find the base when percentage and rate are given	Mental computation of percentage	Word problems involving discount
Learning Procedures			
Activity	Group Discussion and presentation	Creating word problems using real situation	Interview with grandparents (group presentation)
Analysis	What are the steps in finding the base when percentage and rate are given?	What are the steps in solving word problems? How will you identify the percentage, based and rate?	What is discount? What are the advantages of having discount? What is the difference between original price, discount and sale price?
Abstraction	How do you find the base when percentage and rate are given?	What are the steps in computing percentage mentally?	How do you solve for percent problems involving discounts? Original price? Rate of discount? Sale price? Mark up price?
Application	Caterpillar Math Trail	Quiz bee Group math olympiad	Creating word problems involving discount. Finding the missing term (pair activity)
References	BEC PELC II.L.3.2.3	BEC PELC II.L.3.3	BEC PELC II. L.3.4,3.4.1

<i>Date</i>			
Competency	Solving Word problems involving commission	Solving Word problems involving tax	Solving Word problems involving simple interest
Subject Matter	Word problems involving commission	Word problems involving tax	Word problems involving simple interest
Learning Procedures			
Activity	Sandwich making and selling sandwich (group activities)	Presentation of official receipt, electric and water bills, etc. (group activities)	Creating big bank passbook using cartolina with complete data (group activities)
Analysis	How much profit did each group earn? How much is the commission of the seller per piece of sandwich? How much is the selling price?	How much is the selling price of the items in the receipt? How much is the tax per item? What is the rate of tax per item?	How will you compute for the interest and balance of your group bank account?
Abstraction	How do you solve the commission? Rate of commission? Total sales? Total income?	How will you solve for the sales tax and selling price.	How do you solve for the interest? Rate of interest? And time?
Application	Selling school canteen food tray. Each group will be assign in every item. B. Pair activity Solving word problems.	Ladder race group competitions (solving word problems involving sales tax)	Amazing Obstacle Race (group competitions)
References	BEC PELC L.3.4.2	BEC PELC L.3.4.3	BEC PELC L.3.4.4

Appendix N
Lesson Plan for the Control Group
Department of Education Lesson Plan

Forming Ratio and Proportion

I. Learning objective

Cognitive:	Form ratio/proportion for groups of objects/numbers
Psychomotor:	Write ratio/proportion using colon or fraction form
Affective:	Show care in counting and handling things

II. Learning Content

Skills:	Forming ratio and proportion Using colon (:) and fractions in writing ratios and proportions.
Reference:	BEC PELC II.K.1.1,1.1.1
Materials:	box with different objects.

APPENDIX O

Documentation







CURRICULUM VITAE

NIMROD V. FERNANDEZ

Block 8 Lot 62 Phase 3 Celina Plains Subdivision, Poon City of Santa Rosa,
Laguna

Personal Data:

Provincial Address:	Brgy. Poon City of Santa Rosa Laguna
Birthday:	August 11, 1986
Birth Place:	Buenavista, Quezon
Civil Status:	Single
Sex:	Male
Nationality:	Filipino
Religion:	Church of Christ 33AD

Educational Background:

March 2016	Master of Arts in Teaching Mathematics (HS) Philippine Normal University Taft Avenue, Manila
March 2007	Bachelor of Elementary Education Mathematics Concentration Philippine Normal University South Luzon Campus
April 2003	Secondary School Mangaldan National High School Mangaldan, Pangasinan

March 2009 **Elementary School**
 Hagonghong Elementary School
 Buenavista, Quezon

Teaching Experience:

June 2007-March 2008	Computer Teacher Colegion de Santa Cecilia Mamatid Cabuyao, Laguna
June 2008 – Agust 2008	Math Teacher Our Lady of Assumption College Mamatid, Cabuyao, Laguna
August 2008-Present	Grade School Teacher III Jose Zavalla Memorial Elementary School City of Santa Rosa Laguna

Seminars /Workshops Attended:

December 2015	Capacity Building/Seminar Worshop on Education Research Writing(<i>Action Research</i>) City of Santa Rosa, Laguna
November 2015	Curriculum Writer on the Finalization of Localized/Indigenized Mathematics Curriculum under K to 12 City of Santa Rosa, Laguna
September 2015	Regional Accreditation for Sports Officiating Officials Santa Cruz, Laguna
May 2014	8 th National Educators Convention Baguio City, Philippines