PERCEPTIONS OF PUBLIC PRIMARY SCHOOL TEACHERS ON THE IMPLEMENTATION OF SMASE PROGRAMME: A CASE OF NDIA DIVISION, KIRINYAGA COUNTY IN KENYA

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E55/CE/23003/10

A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF EDUCATION IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF EDUCATION OF KENYATTA UNIVERSITY

JUNE, 2014
DECLARATION

This research project is my original work and has not been presented for award of a degree in any other University.

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To my dear wife Wambui Jane Kihara for her dear love, wise counsel, patience and encouragement. To my dear sons Manasseh and Williams for their tolerance and patience.
ACKNOWLEDGEMENT

I greatly express my thanks to the following people who have devotedly contributed to my success. Special acknowledgment goes to Prof. Grace Bunyi and Dr. Florence Kithinji for their devotion in the writing of the research proposal and the research report. Their keen interest, professional guidance, unreserved support and encouragement throughout the research contribution to the completion of this project report. I also wish to thank sincerely my wife Jane Wambui Kihara her love, encouragement and supporting me morally, socially, spiritually and more so financially. My greatest respect and appreciation go to entire department of educational management, policy and curriculum studies, Kenyatta University for their good organization in teaching techniques. District educational offices Kirinyaga West Mr. Stephen Mulandi and DQASO of Kirinyaga West district Mr. J. P Maina for their assistance and understanding during the study. I am also grateful for my Deputy Head Teacher Mrs. Mary Mwangi, my colleagues Mr. Munene Njege and all head teachers who supported me during data collection. I also thank all those who assisted me in getting information I needed.

God bless you all.
ACRONYMS

SMASE  Strengthening Mathematics and Science Education.
ASEI  Activity Students (learners) Experiment Improvisation.
PDSI  Plan Do – see Improve
CEMASTEA  Centre of Mathematics, Science Technology Education in Africa.
P.T.T.C  Primary Teachers Training College
TAC  Teachers Advisory Centre
QASO  Quality Assurance and Standard Officers.
DQASO  District Quality Assurance and standard Officers.
D.E.O  District Education Officers
KRT  Key Resource Teachers
JICA  Japan International Cooperation Agencies.
SBTD  School Based Teachers Development.
INSET  In-service Education and Training
KIE  Kenya Institute of Education
KNEC  Kenya National Examinations Council
MoE  Ministry of Education
FPE  Free Primary Education
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The strengthening mathematics and science education – in-service education and training (SMASE INSET) in primary school has been initiated to improve pedagogical methods used by teachers teaching mathematics and science in public schools. It also addresses issues of attitude towards both teachers and pupils both teachers and pupils, how the content can be delivered within speculated time as well as use of resources mobilization and management. The proposed study was to establish the perceptions of teachers in the implementation of SMASE INSET in public primary schools, because good performance in our primary schools depends on teachers using guiding principles of SMASE INSET. Their perception has shed light so as to improve the implementation of SMASE. The Activity Student Experiment Improvisation (ASEI-PDSI) paradigm of the trends in the teaching and learning science and mathematics and according to the finding of several, need surveys. The study employed survey research design and use the questionnaire and interview schedule as the key data collected tools. The population of the study comprises of all the 41 public primary school teachers and head teachers of those schools in Kirinyaga West district. From the population, the researcher randomly sampled seventeen schools to participate in the study. All the science and mathematics teachers participating in the SMASE INSET participate in the study. The researcher also interview the trainers. Data from the teachers was collected using a questionnaire while that of the trainers was collected via an interview. Data collected from the field was coded and entered to the computer for analysis using statistical package for the social sciences (SPSS). Descriptive and analytical statistics was used to analyze the data obtained. The results of the data analysis was presented in frequency tables, histograms, percentages. Quantitative statistics was used to describe and summarize the data.
CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Education can be viewed at as an investment in human skills. Investment in education can help to foster economic growth, enhance productivity, and contribute to national and social development as viewed in vision 2030. Provision of quality education is a major concern in the ministry of education. The level of a country’s education is one of the key indicators of its level of development UNESCO (2005).

Thus teachers contribute much in national development. For them to facilitate quality education continuous training of teachers is emphasized at all levels of learning. Sarifa (2007) argues that learning involves quality development of skills, knowledge and concepts and more so acquire values applied in life. In realization of this, the government has sought ways to make learning real by introduction of SMASE programme.

Initially, the education system of Kenya acknowledges the necessity of implementing In-Service Education and Training (INSET) as a way of addressing the difficulties the public primary school teachers are experiencing during the teaching of science and mathematics, Craft (1986). The implementation enhances teachers’ profession development.

SMASE Project was established in public primary schools after the finding of the need assessment survey was carried out. It was found that the project started in secondary schools where there emerged some challenges experienced by the learners.
in science and mathematics that could have been addressed if intervention measures were employed in primary schools, SMASE Project (2009). The purpose of the project is to strengthen quality of science and mathematics education at primary and secondary school levels in Kenya through In-Service Education and Training (INSET).

In preparation for the SMASE primary science and mathematics INSET need survey was conducted in 52 primary school across the country in May through June 2009, SMASE project (2009). Findings of this survey have highly informed the context of the training which was conducted over three years starting from 2010, 2011 and 2012. The survey showed that learning is teacher centered where pupils are passive learners. It also showed that lecture method is commonly used in teaching while lessons are theoretical. In teaching/learning practicals are not conducted and pupils are not involved in improvisation. Following the SMASE findings, the SMASE programme was developed.

However in 1998, SMASE INSET was started in secondary schools since there was a big concern in mathematics and science performance. The piloting took five years after which it was realized that it could have been started in primary schools. In 2009 a curriculum was developed to improve teacher’s competence on their pedagogy and content mastery. The development/improvisation of learning materials was also a major concern as well as administration and management issues. That’s why the INSET trickled down to primary schools in training primary school teachers in April 2010. Teachers were clustered in 8 clusters within the district. Teachers teaching science and mathematics from standard 6 – 8 attended the INSET. In these cluster meeting teachers interacted and exchanged experiences. The cluster include;
Kibirigwi, Gacharu, Kiburu and Gathambi primary schools. The programme promoted collaboration, Dunne (1964), risk taking share strategies and solve problems. The interaction helps to improve instructional professional knowledge, interests and skills to the teacher hence teachers transfer this to the pupils.

SMASE INSET realized there is need for the ASEI – PDSI approach in primary schools to enhance the teaching of the subjects.

1.2 Statement of the Problem

The current trends in the teaching and learning of science and mathematics and the needs of a society are the main pedagogical considerations when making a curriculum for an education system. For teachers to effectively play their roles in such a dynamic situation the importance of In-service Education and Training (INSET) is to continuously update their skills and their abilities cannot be overemphasized. Teachers undergo INSET due to; curriculum change, the changing trends in the teaching and learning of science and mathematics subjects, teachers' professional development, follow up, rising cost of education, technological advancement and emerging issues, SMASE (2009). The teaching and learning process has had serious challenges in keeping pace with the current trends in education and in meeting the expectation of the society. Feedback from formal examination and observations by stake holders constantly indicate a shortfall in education (MoE) in its capacity as a controller and implementer of activities in education has put into motion corrective measures to address the situation. One of the measures is the SMASE INSET. Since the SMASE programme was introduced to science and mathematics teachers in public primary schools, it has not been known whether teachers perceive it positively or
negatively. The study sought to investigate perception of public primary teachers in the implementation of SMASE INSET in Kirinyaga West District (Ndia Division).

1.3 Purpose of the Study

The purpose of study was to establish the perception of public primary school teachers on the implementation of SMASE INSET.

1.4 Objectives of the Study

Specifically, the study sought to:

1. Investigate teachers’ perception of the SMASE INSET.
   i. In the SMASE training INSETS.
   ii. Implementation of the SMASE in the classroom situation.
   iii. Skills learnt in the cluster centres which include teachers’ practices, work planning, methodologies as well as resources used.

2. To establish challenges perceived by science and mathematics teachers in the implementation of the SMASE program.

3. To establish the perception of the public primary school teachers in addressing the challenges perceived by science and mathematics in the implementation of the SMASE program.

1.5 Research Questions

1. What do the teachers think about the:-
   i) Training in the cluster centers?
   ii) How do they perceive the trainers?
   iii) Duration of the course?
   iv) Actualization?
2. How do the Science and Mathematics teachers perceive the ASEI- PDSI Paradigm in SMASE Programme?

3. How do the teachers perceive the curriculum and instruction in the implementation of SMASE programs?

1.6 Assumptions of the Study

It was assumed that:-

1. Mathematics and science teachers were applying the ASEI – PDSI approaches in their teachings.

2. Science and mathematics teachers had positive attitude in the implementation of SMASE.

3. The information given by respondents was fair enough in giving true information, Orodho (2009).

1.7 Limitation of the Study

Due to limitation of time and distance of schools from one to another especially in the western part of the district, the study was limited to public primary schools in Kirinyaga West district.

1.8 Delimitation of the Study

The study was limited to science and mathematics teachers in public primary schools in Kirinyaga West district, bearing in mind that the INSET is carried out in Kenya as a whole. Limitation of resources, made the study be carried out in a small part of the country. The study was limited to the public primary since private schools do not participate fully in the INSET. Their number was compared to public schools was minimal.
1.9 Significance of the Study

The significance of the study was solely on perception of public school teachers in the implementation of the SMASE INSET. The study was to help teachers acquire appropriate methods of teaching mathematics and science hence made learning to pupil centered and not teacher centered. It was also to help researcher to execute more complex study in future and provide data that can be compressed within the district among others. It was further to provide an opportunity to share solutions of related problems as well as help the government through the Ministry of Education to come up with strategies needed to acquire effective implementation of SMASE INSET in primary schools which enables teachers, pupils and parents change their negative attitude towards the subjects.

Studies reveal that SMASE INSET was started recently in public primary schools. It has not been revealed how teachers perceive the implementation of the programme. The perception falls in the cluster centers, training in the INSET, actualization, pedagogy, curriculum and instructions. This then calls for effective interventions to make the SMASE project a success in all public primary schools. In the implementation of the project science and mathematics teachers are the key resource persons involved in the current change of the new technology realized in the accomplishing vision 2030, Kenya vision 2030 (2007).

This study will reveal the perception of science and mathematics teachers in public primary schools in the implementation of the SMASE project. The SMASE implementation will largely determine its effectiveness, which will be seen through sustained high academic performance in the pupils.
1.10 Conceptual Framework

Figure 1.1 Teachers’ perception on SMASE in public primary schools

CLUSTER CENTERS
- School Distance
- Facilities
- Time factor

TRAINING
- Workload
- Teamwork
- Instruction
- Course duration
- Trainers

ACTUALIZATION
- Classroom situation
- Physical Material
- Teacher preparation

PEDAGOGY
- ASEI-PDSI
- Difficult topic

CURRICULUM & INSTRUCTION
- Syllabus coverage
- Evaluation

QUALITY TEACHING
1.11 Operational Definition of Terms

SMASE - A study carried out to strengthening mathematics and science education.

Curriculum - Subjects that are included in the course of study or taught in a school, college.

Poor performance - Score that do not meet the examination entry points to the next class as well as in KCPE.

Attitude - It's a way an individual feels and think towards situation such as bad, good, negative or positive.

Effectiveness - This is an application of the content learnt in SMASE INSET.

Challenge - Refers to a restricting condition

Strategy - A plan or policy adopted in managing challenges of SMASE.

Perception - The act or faculty of apprehending by means of the senses or of the mind; cognition; understanding.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents a literature related to the study. The chapter is divided into four major sections; the first section reviews the significance of the teacher training, while the second section gives an overview of reflective teaching. The third section reviews section of SMASE INSET and section four looks at the summary of literature review.

2.2 Significance of Teacher Training

Training steers up the teacher with skills, knowledge and attitude. The intelligence of a teacher opens up which then determines the quality of teaching in a class. The training helps the teacher improve learner's achievement in any level of learning. Therefore high quality teaching produces good learning atmosphere in a classroom. Training improves classroom management. This enhances pupils learning, which involves planning the activities, organizing how those activities will be carried out, the resources required and general arrangements of the classroom, Burden (1995).

In a school setting, teaching is taken as a vital thing. The organization should ensure that there is continuous learning of teachers such as in-service courses, seminars and workshops. Quality of a teacher is attributed by types of training and is the outputs in pupils' performance. Education planners need to emphasize more on teacher training in order to improve pupil's performance in school. Teachers should be conversant with changes in the curriculum. The changes enhances planning of learning opportunities intended to bring certain changes in the learners as well as making real of which has been planned, Shiundu (1992), and improving pedagogical methods of teaching.
In-service training help teachers to share knowledge gained, provide opportunity to share problems and reach common solutions. It also enhances sense of team spirit, assists to identify and address common issues affecting the school. However in-service enable teachers to acquire adequate facilities, have opportunity to plan way forward, share ideas, be organized and encourage group work as well us planning adequately.

Training help teachers change their behavior such as being a reflective teacher, how to listen, observe, evaluate lesson, have classroom talk, enhance classroom management, able to guide and counsel and help learners community effectively.

2.3 Reflective Teaching

SMASE INSET was invited by the poor performance in mathematics and science in public primary schools. The performance has been affected by the methods of teaching and poor approach even after teachers leave the training colleges. Curriculum innovations bring out the pedagogies and approach in teaching and especially in mathematics and science, Sifuna (1975). Pupils are not given an opportunity to talk, they do not work collaboratively, they aren’t given time to learn by doing. Special needs for learners are not considered, both boys and girls need to be supported in their learning. Reflective teaching enhances learner-centered and not a teacher-centered lesson. In a learner-centered lesson, the learner becomes more attentive and gets fully involved in a lesson and provides good teacher/pupil relationship.

The proper learning of mathematics and science is important in that teachers think about their strengths and weaknesses with a view of improving their classroom
practice and the children’s learning, Polland (1996). This helps the teacher develop professionally thus helping learners achieve much in their studies as well as improving the quality of primary education.

A reflective teacher is one who promotes classroom talk, set classroom talk activities, makes his/her explanation clear to the learners, has effective questioning and is conversant to why is classroom talk important in children’s learning, Sulton (1981). A teacher is a mentor, organizer, instructor, passionate, role model, a good learner, motivator, innovator, implementer, provide security and provide guidance and counseling to his/her learners. The qualities help a teacher to develop effective communication skills in mathematics and science lessons, and also helps the learner to construct his/her own knowledge and experience through modification of his/her pre-existing ideas in the light of new awareness and viewpoints gained through communication.

Reflective teaching enhances effective teaching therefore the poor performance in mathematics and science is a major source of concern to the government, parents and educators thus calling for remedial action. Among the possible reasons for the situation in the teaching approach where through SMASE the ASEI (Activity Learner Experiment and Improvisation) - PDSI plan do see and improve pedagogic paradigm is being advocated to rally mathematics and science teachers in refocusing their classroom practices. The approach ensures quality teaching and learning.

Effective teaching requires one to continually improve through reflective on and refining instructional practices. It is during planning that the teacher on the most
appropriate activities that will enhance effective teaching and learning. For learning
to be active, the main teacher's role should be facilitation on learning rather than as a
dispenser of knowledge. Improvement on instructions based on outcome of the
evaluation is a continuous activity which ensures that the teacher's skills improve and
confidence increases, leading to enriched instructional programmes hence quality
education. This is only possible if one adopts the ASEI – PDSI approach SMASE
Project (2009).

The approach benefits the teacher to achieve set objectives, help to make work easier,
teaching becomes enjoyable, creates confidence, avoid embarrassment, mastery of
content, change of attitude towards teaching of science and mathematics and also help
to manage time.

2.4 Finding of SMASE Inset

In order to come up with course content for the primary INSET, a need survey was
done in May and June 2009. The main aim was to establish the needs of primary
school teachers and primary school pupils which could be addressed by the INSET.
The sampling and survey was done in all the eight (8) provinces in the country, 19
Divisions and 52 primary schools. The stakeholders involved were:

- Mathematics and science teachers –class 6, 7 & 8.
- Pupils in classes 6, 7 and 8
- TAC Tutors
- ZQASO
- Key Resource Teachers (KRT)
- Headteachers
The PTTC tutors were involved in developing of instruments for the survey and developing the curriculum and training manuals for the regional INSET, SMASE Project (2009).

The main issues isolated from the survey finding shows that some needs are lacking but most of them need strengthening. These include:-

- **Attitude**: The attitude of people is positive but still requires strengthening.
- **Teaching method**: Inappropriate teaching is used by teachers. Majority of them use lecture method while others use teacher-centered approaches in teaching.
- **There is over-reliance on textbooks and revision papers**
- **Mastery of content**: The mastery of content by some teachers is inadequate and needs upgrading.
- **Discussion forums**: Few or non-existent interactive forums for teachers.
- **In-service programs**: There are a few in-service programmes in some areas but they are not very effectively carried out, some had stopped and most teachers were not attending or benefitting from them. Teachers also have inadequate time for INSET due to work load.
- **Large classes**: This is as a result of free primary education.
- **Diversity of pupils' ability**: There are cases of pupils with special needs in the schools and all teachers need to be in-serviced on how to handle the situation.
- **Advice from the TAC tutors and QASOs**: Infrequent advice from the administrators who work administratively instead of the advisory role to teachers.
- **Community support**: Inadequate support to schools by the community. In some cases, the community is not supportive especially after free primary education. Most parents have neglected their children and are left to the teachers.
• Difficult topics in mathematics and science and are expected to use the ASEI – PDSI lesson plan which seem to be difficult for such topics.

• Availability and utilization of the teaching/learning resources: the resources are available but most teachers teach theoretically, not relating the relevance of subjects to pupils’ environment and everyday life.

• ICT incompetence: majority of the teachers are not ICT literate

• Work planning: majority of teachers do prepare schemes of work but not many prepare lesson plan.

In the survey, learners cited reasons such as science and mathematics being difficult to understand, concepts not well understood, lack of apparatus and resources, poor teaching methods such as teachers telling pupils to read for themselves, teachers absenteeism, harsh teachers, measurement of angles, construction and cramming formulae.

The finding also realized there are issues beyond SMASE. These include staffing shortage, heavy work load, lack of adequate infrastructure, promotions, large classes, poverty, insecurity, early marriages, child labor and teachers’ perception among many.

It was realized that from the findings that teachers need to share experience overboard so as to expose their areas of difficulties in teaching. The SMASE INSET came up with ASEI/PDSI strategies to teach the contents on the syllabus to ensure quality of Mathematics and science lessons and their steady improvement the project promotes
ASEI movements and PDSI approach. The ASEI movement represents a clear shift in both teachers thinking and practice from:

- Knowledge based to activity learning
- Teacher-centered to pupil-centered teaching
- Standardized experiment to small scale experiment practical work and improvisation.

The students are thus involved in learning through:

- Hands on activities
- Minds on activities
- Hearts on activities
- Eyes on activities
- Mouths on activities

The success of the ASEI movement depends on the adoption of the PDSI approach which advocates for planning, doing, seeing and improve. This is achieved through the development of training manuals, peer teaching and development of classroom based activities. Demonstrations during training sessions and field in schools by both the national trainers and the Division trainees are done, Gakuru (2005).

The study resolved that there is effectiveness of the use of ASEI-PDSI on the teaching of science and mathematics. The study shows that the pupils perceive more on the ASEI-PDSI approach. The study emphasizes on the actualization teaching and learning methodologies and good mastery of the content. It was learnt that there is
need for teachers to learn from one another, have will to attend the INSET, teachers to teach other teachers on the use of ASEI-PDSI in teaching.

Study carried out in 2010/2011 in Ndia Division in Kirinyaga County shows that most schools have small untidy rooms for the INSET and storage rooms for training materials are lacking. During the INSET most headteachers are not in school and do not delegate duties to anyone. Emerging issues beyond trainers are not handled.

There is poor time management for the INSET cluster meeting start very late. Finances for the participants come very late, this discourages the teachers. Some participants come from very far and incur huge costs on transport.

2.5 Summary of the Literature Review

Student’s performance is enhanced by the training a teacher has. This stimulates the teacher to come up with new strategies as demanded by the curriculum. High quality teaching produces superior teaching in classroom. It is from the training where a teacher gains knowledge skills and attitude that make him/her manage a class. The government has come up with initiatives to enhance teacher’s development. These opportunities are all over the country teachers to go back to class, update, acquire new skills and implement them in school.

This study focuses on SMASE INSET as taken by mathematics and science teachers. The main aim of SMASE INSET is to improve the quality of teaching and learning of mathematics and science and make it learner-centered and not as before. Hence reflective teaching has been discussed before and how it influenced students learning.
The CEMASTEA finding have reviewed and found that SMASE INSET goes beyond the rest of the initiatives SMASE Project (2009). Since it is countrywide INSET involving all the teachers handling mathematics and science and also compares Kenya with the rest of the countries in Africa in conjunction with JICA.
CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter sought to cover the methodology that was used in the study. It discussed the research design, target population, sampling procedures, data collection instruments, validity of the instruments, data collection and analysis procedures.

3.2 Study Design

The study used the study design. The design was considered appropriate for the study because according to Kothari (1985), study was concerned with describing, recording, analyzing and reporting conditions that exists. Kerlinger (1973) argues that study method was widely used to obtain data useful in evaluating present practices and in providing basis for decisions.

The study design was used to investigate the impact of perception of public primary school teachers on the emplacement of SMASE programme in the teaching of mathematics and science in Ndia Division in Kirinyaga County public primary schools. Troops (2006) advocates pupil-centered learning and observe that the major purpose of study design can be used to collect information about pupils' attitude, perception, opinion, habit, or any of the variety of education or social issues. Ordho (2003) observes that study design research was used to collect data to answer questions and evaluate the strategies adopted by SMASE programme.
3.3 Locale of the Study

The study was carried out in Ndia Division in Kirinyaga County which its headquarters is at Baricho. The division neighbors with the following divisions; Central, Mwea and Gichugu.

The Division has forty one (41) public schools of which one is girls boarding. The western part of the Division is a bit hilly where coffee is the main cash crop. On the northern part, tea does well while the upper zone is under forest (slopes of Mt. Kenya on the southern part). The central and eastern parts are rich in subsistence farming while the southern area is flat thus rice does well in the area. The Thika-Karatina road passes through the western part of the Division. Two main rivers run along the area; Rwamuthambi and Ragati. They provide water for irrigation especially at Kibirigwi-Kibingoti area. Conclusively, the Division lies in an economic activity region.

3.4 Target Population

The target population was defined as the members of a real or hypothetical set of people. The researcher regeneralized the results of Borg and Gall (1989). The researcher targeted one hundred and twenty three (123) teachers attending SMASE INSET in Ndia Division.

3.5 Sample and Sampling Procedure

Quite a number of scholars have suggested various ways of arriving at a representative sample size. It is generally agreed that the larger the sample, the smaller the error. The researcher selected seventeen (17) public primary schools out of the forty one (41) public primary schools in Ndia Division in Kirinyaga County to
participate in the study. They represented 41.46% of the targeted population Borg and Gall (1983). According to Gay (1976) random sampling was the best form of sampling as it allowed all members of the population to have almost equal and unbiased chance of appearing in the sample. The 51 out of 123 sampled science and mathematics teachers in the public primary schools in Ndia Division participated in the study. To randomly select the sampled schools, the researcher wrote down the names of all public primary schools in the Division on similar pieces of paper and folded them evenly.

The researcher then shuffled the papers after which he picked seventeen (17) papers at random. The schools whose names were picked comprised the study sample.

3.6 Research Instruments

The researcher instrument employed in the study were the science and mathematics teachers undergoing the SMASE INSET questionnaire and interview schedule. The researcher consulted the supervisors who as experts verified the appropriate instruments for obtaining the needed information Kiess and Bloomquist (1985). The questionnaire offered considerable advantages in gathering information Gay (1976) advocates that questionnaire gives respondents freedom to express their views or opinion and also to make suggestion. Details about the instruments are presented below:

3.6.1 Questionnaires

The researcher used a SMASE teachers' perception questionnaire to collect data from the science and mathematics teachers. The questionnaire comprise of both open-ended
and closed-ended. Borg and Gall (1983) emphasize that whereas the open ended types of questions gave informants freedom of response, the closed ended types facilitate consistency of certain data across informants. The questionnaires contained items needed to cover all the research questions. This gave the demographic data and their perception on the SMASE programme.

3.6.2 Interview Schedule

The study employed an interview schedule with the 8 science and mathematics trainers in the public primary schools in Ndia Division in Kirinyaga County. The interview was designed to collect data concerning perception of public primary school teachers in the SMASE programme. The interview schedule as a research was unique in that it involved the collection of data through good rapport and co-operative atmosphere between respondents. It permitted the researcher to follow up leads and thus obtain more data and greater clarity Borg and Gall (1983).

3.7 Piloting

Before the actual data collection, piloting of questionnaire was done on three public primary schools which did not participate in the final study.

3.7.1 Reliability of the Research Instruments

Piloting enabled the researcher to test the reliability of the instrument. The researcher used the pilot study to identify any items in the questionnaire that were ambiguous or unclear to the respondents and change them effectively. The pilot study enabled the researcher to familiarize himself with information of the instruments.
3.7.2 Validity
According to Gay (1987), validity was established by expert judgment, thus the questionnaire was constructed in close consultation with the University Supervisors among other experts.

3.8 Data Collection
The researcher got an introduction letter from Kenyatta University and a research permit from the Ministry of Education, Science and Technology (MoEST). Thereafter, the researcher booked an appointment with headteachers of the sample schools to visit and administer the questionnaires. The researcher visited each of the schools and administered the questionnaire himself. The respondents were given guidelines on how to respond and asked not to put their names on the questionnaires, and assured of confidentiality after which they were given a week to fill in the questionnaires. After the one week, the researcher collected the filled-in questionnaires.

The researcher then booked an appointment with the Quality and Standards Officers to visit them and carry out the interviews. The data collected on the process took three weeks.

3.9 Data Analysis Procedure
Data collected from the field was coded and fed into the computer for analyzation using the Statistical Package for Social Science (SPSS). Descriptive and analytical statistics was used to analyze the data obtained. The results of the data analysis was presented in frequency tables using frequencies and percentages.
CHAPTER FOUR
DATA PRESENTATION AND ANALYSIS

4.1 Introduction

The purpose of the study was to investigate public primary school teacher's perceptions of the science and mathematics (SMASE) teachers training programme. The study was carried out in Kirinyaga West district in Kirinyaga county and involved 51 teachers from different schools. The chapter analyses responses to the research questions:

1. What the teachers thought about:
   i) Training provided in the cluster areas
   ii) The competence of the Trainers
   iii) Duration of the course
   iv) actualization

2. How the science and mathematics teachers perceived the ASEI-PDSI paradigm in the SMASE programme

3. How the teachers perceived the curriculum and instruction in the implementation of the SMASE programs

4.2 Biodata of the participants

4.2.1 Teachers

The researcher sought to know the gender of the participant. The government of Kenya recommends gender balancing and in the study and the criteria was fulfilled recommended in the constitution.
Table 4.1 Gender of the Teachers

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>35</td>
<td>69</td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.1 shows the percentage of male teachers was thirty five representing 69% while the females comprised of sixteen representing 31%. The sex of the respondents, shows that the numbers of male teachers were dominant in the science and mathematics subjects.

4.2.2 Participants composition in the SMASE programme

The researcher sought to know the selection criteria to the SMASE programme of the teachers. The table 4.2 shows the results of the finding.

Table 4.2 Selection for SMASE Programme

<table>
<thead>
<tr>
<th>Selection of teachers</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taught mathematics std 7 and 8</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td>subject panel</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Science teacher</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>head teacher</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

In the table 4.2 selection of teachers twenty nine (58%) of the teachers were teaching science and mathematics, fourteen (28%) science teachers only, seven (14%) were
selected by selection panel and one (2%) by the head teacher. The right participants were included in the training as all did science and mathematics.

4.3 What the teachers thought about the training provided in the cluster areas

The teachers were asked about what they thought of the cluster centre’s training they received. They were to indicate whether the content was adequate, whether this improved their skills, whether all of the course content was relevant to what they did before and whether they benefitted from the training.

4.3.1 Time the teachers took in a cluster centre in a day

The researcher sought to know how much time was spent in the training in the SMASE centres. The figure 4.1 shows the findings of the time the teachers took in the cluster centre in a daytime. Time spent in the cluster centre was important so that there would be coverage of the syllabus.

![Figure 4.1 Time they took in a cluster in a day](image)

**Figure 4.1 Time they took in a cluster in a day**
Figure 4.1 shows that the majority thirty nine 76% took 8 hours while those who took four 5, 6, and 7 hours represented by 8% each. Most of the teachers took eight hours which was a whole day in the training. The course was comprehensive and a lot had to be covered in the short time duration.

4.3.2 Whether the training was beneficial to a science and a mathematics teacher in the day

The table 4.3 shows the results of the findings on whether training was beneficial to the science and mathematics teacher in the day.

<table>
<thead>
<tr>
<th>Whether training was beneficial as SMASE teacher in the day</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>46</td>
<td>90</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

The table 4.3 shows that the majority of the teachers representing 90% said training was beneficial to the science and mathematics and 10% said it was not. Training and time management was an important aspect in the planning. With time more can be achieved in a day or in a given span of time as in the SMASE programme. The training was beneficial within the time allocated and the teachers benefitted from the training.
4.3.3 Whether the Facilities were Adequate

Facilities selected were important for training and the researcher sought to find out whether these could affect the training of the teachers. The table below shows the results of the finding.

Table 4.4 Whether the facilities were adequate

<table>
<thead>
<tr>
<th>Whether facilities were adequate</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39</td>
<td>76</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.4 shows that the majority of the teachers representing 76% said facilities were adequate and 24% said they were not. Facilities for the training were provided for as they were a perquisite for the success of the programme.

With little resources provided to cater for such programmes adequate provision is always illusive especially in the developing nations where resources are barely enough to meet the basic needs.

4.3.4 Whether time was well managed in the Cluster Centre’s

Time was an important resource in the training and the researcher sought to find out how well the trainers utilized the time.
Table 4.5 How time was managed

<table>
<thead>
<tr>
<th>How was it managed</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching relevant things</td>
<td>24</td>
<td>.50</td>
</tr>
<tr>
<td>Stuck to the time table</td>
<td>24</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.5 shows that of those who said time was well managed 50% said time was used in teaching relevant things and another 50% said they stuck to the time table.

4.3.5 Specialization groups in the cluster centers

Groupings in the cluster centre’s were meant to help the teachers discuss in the areas they shared together and bring out experiences in their subjects. This would help them to know how best they could approach the training. Some of the teachers had success cases in their experiences and these would help those that did not. The groupings would also help them to discuss what they learnt and reinforce on what the trainers had taught. An important aspect of the SMASE the teachers together so that they could share out their experiences as part of the learning process. Most of them after their formal training had not had an opportunity to share out their experiences or attend training.

The table 4.6 shows specialization groups in the cluster centers

Table 4.6 Specialization groups in the cluster centers

<table>
<thead>
<tr>
<th>Specialization groups in the cluster centers</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39</td>
<td>76</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.6 shows that the majority of the teachers representing 76% said there was specialization of groups in the cluster centers and 24% said there were none.

4.3.6 If yes, how they perceived the groupings

The figure 4.2 shows how the teachers perceived the groupings:

![Bar chart showing teacher perceptions](image)

**Figure 4.2 How they Perceived the Groupings**

Figure 4.2 shows how the teachers perceived the groupings. They were perceived as improving discussion by 39 teachers, in the subject area by thirteen (33%), and that they brought togetherness by twelve (31%), and perceived to be very good by nine (23%) and those who said they shared ideas five (13%).

The groupings were perceived as providing science and mathematics teachers with opportunities for continuous professional development; facilitating collegiality and collaboration among teachers of specific disciplines; and incorporating change process in professional development.
4.3.7 Perception of group participation in the subject area

The figure 4.3 shows the perception of group participation in the subject area

Figure 4.3 Perception of group participation in the subject area

The figure 4.3 shows those who perceived group discussion as making participants active were 52%, 29% positively received them and 20% said new ideas were shared.

4.3.8 Whether Groups were well Monitored

The groups were monitored to enquire the progress they made as part of the training process. Groupings were an important aspect in the training as the teachers shared experiences, understanding of the subjects, which could help the other teachers.

The table 4.7 shows how the groups were monitored.

<table>
<thead>
<tr>
<th>Monitoring of the groups</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitator checked</td>
<td>36</td>
<td>71</td>
</tr>
<tr>
<td>Reporting by the members to the other members</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.7 shows that those who said the facilitator checked the group’s progress were 71% and 29% said it was reporting to the other members. Monitoring was important to ensure that the teachers benefitted from each other. This was done by the facilitators and also the group members assisted in monitoring each other in the groupings.

4.4 How the teachers thought about the competence of the trainers

In this section the researcher sought to find out if the trainers were relevant and helpful to the SMASE teachers. Trainers helped the teachers to acquire skills and attitudes that helped to improve in the delivery and performance of the teachers. The training of science and mathematics teachers aimed to improve their skills so that low grades posted in the subjects would improve.

There is a growing consensus that improving students ‘learning depends on a teaching force with appropriate beliefs and attitudes towards teaching and learning; and who possess content and pedagogical knowledge quite distinct from the usual instructional practice in most classrooms.

While initial teacher training nurtures these characteristics, it is in sufficient to prepare teachers for the greater challenges of everyday teaching, where, time constraints and pressure from summative assessments overwhelm both newly quailed and experienced teachers. Besides, in rare cases where there are innovative practices, these are individual initiatives rarely supported by others due to lack of opportunities for sharing, efforts which consequently dampen with years of service.

Whereas in-service teacher education complements initial teacher training, there is lack of adequate and appropriate opportunities for most practicing teachers to enhance
their skills and align their practice to the reform visions in education. Moreover, professional development which focuses on practice alone without reflective lenses in terms of theoretical perspectives.

4.4.1 Training given by the SMASE Trainers in the Inset

Table 4.8 shows the training given by SMASE trainers in the inset

<table>
<thead>
<tr>
<th>Training by trainers in the SMASE inset</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39</td>
<td>77</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.8 shows that the majority of the teachers representing 77% said training was given by the SMASE teachers in the inset and 23% said it was not.

4.4.2 If no, why they didn’t like the training

![Figure 4.4 Why the Teachers did not like the Training](image)

Figure 4.4 Why the Teachers did not like the Training
Figure 4.4 shows that of twelve who did not like the training six (50%) said it did not add to what they knew while three (25%) said facilitators were not serious and another three (25%) said the approach to training was not good.

Lack of proper training needs analysis could lead to training programmes that consume time and resources that need not be. A pilot study before starting a programme should have been done where the stakeholders express their need the best way to address a problem.

4.4.3 Whether Trainers were Competent

Table 4.9 shows whether the trainers were competent as the teachers responded.

Table 4.9 Whether Trainers were Competent

<table>
<thead>
<tr>
<th>Whether teachers were competent</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47</td>
<td>91</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.9 shows that the majority of the teachers representing 91% said trainers were competent and 9% said they were not. In every training session, the trainers needed to be prepared so that the learners could benefit from training. Well prepared trainers were appreciated and respected. It is easy to recognize a trainer who is not well trained for lack of order, consistency and uneasiness. For those who had been in training long it would be easy to note whether their trainers were competent.
4.4.4 If No, why they were not competent

From those who thought the trainers were not competent their responses are shown in the table 4.10

Table 4.10 why the groups were competent

<table>
<thead>
<tr>
<th>Why they were not competent</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not adequately trained</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>They delivery was not good</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.10 shows that of those who felt trainers were not competent 75% said delivery was not good, and 25% said the trainers were not adequately trained. The number of those that thought the trainers were not competent for the reasons above. An advance questionnaire stating what was to be taught and the list of preferred topics in the beginning of training would assist.

4.4.5 Relationship between trainers and participants

In every form of training the trainer should be able to generate trust and respect as the trainer from the trainee. This is developed as the trainer trains by showing mastery of the subject and following the course content to be able to thoroughly meet the expectations of the trainee. The responses from the teachers of their relationship with their teachers are shown in the table.
Table 4.11 Relationship between trainers and participants

<table>
<thead>
<tr>
<th>Relationship between trainers and participants</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>33</td>
<td>65</td>
</tr>
<tr>
<td>Good</td>
<td>18</td>
<td>35</td>
</tr>
<tr>
<td>Poor</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Very poor</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

The table 4.11 shows that the majority of the teachers comprising of 65% responded that the relationship between the trainers and the participants was very good while 35% it was good. Good relationship with the teachers helps to improve the learner ability. Where there is trust from the learner on the trainer it builds confidence in the trainee.

4.5 What the teachers thought about the duration of the course

4.5.1 Adequacy of the time spent in the SMASE Training

![Figure 4.5 Adequacy of the time spent in the SMASE Training](image)

Figure 4.5 Adequacy of the time spent in the SMASE Training
The figure 4.5 shows that the respondents said that the time was very adequate eight (16%), twenty six (52%) adequate, and sixteen (16%) said it was not adequate and one (1%) said it was very inadequate.

Adequate time is required for synthesis and comprehension of the subject. While some find it easy to follow the trainer the slow leaner need to be considered. This seems to be time wasted to quick learner. A balance is required in every form of training.

4.5.2 If Adequate how this Affected Programmes

Figure 4.6 shows the responses of the teachers if the time was adequate and how it affected other programmes.

Figure 4.6 shows that of those saying it was adequate 46% said it reduced time for other programmes, 28% improved training and 26% said other things were affected. Programmes which are introduced could have effect on other programmes. Those that
have positive effects on others are supported especially if the implanter does not suffer extra strain through the programme.

4.5.3 Whether the Instructions given were clear

Table 4.12 shows responses of the teachers on whether the instructions were clear

<table>
<thead>
<tr>
<th>Whether the instructions given were clear</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47</td>
<td>92</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 4.12 shows that the majority of the teachers representing 92% said instructions were very clear and 8% said it was not. When instruction is clear it helps in the programme implementation and solicit support from all. Well-designed programmes become success cases in a very short time and rate of adoption is very high.

Instructions may fail to be clear because of not addressing the subject matter and are regarded as being irrelevant and when also communication breakdown occurs. An assessment of whether flow is solicited through asking if it is clear.
4.5.4 Coordination of the teamwork in the SMASE inset

The figure 4.7 shows the coordination of teamwork in the SMASE inset

![Graph showing coordination of teamwork](image)

**Figure 4.7 Coordination of the teamwork in the SMASE inset**

Figure 4.7 shows that the Majority of the respondents twenty nine (57%) said coordination of the team work in the SMASE inset was relevant, fourteen (27%) was very relevant, seven (14%) irrelevant and one (1%) very irrelevant. Coordination in the programme was relevant. Teamwork building enhances success of the programme.

4.5.5 If Relevant how the team Members Benefited

From figure 4.8 of those who said it was relevant, the researcher sought to know how the team members benefitted
Figure 4.8 How the team Members Benefited

Figure 4.8 shows that of those who said that the coordination was relevant 44% said it created awareness, 21% that it improved the relationship between child and teacher, 19% said there was no time wasted and 16% said that there were new skills added.

4.5.6 How relevant the certificate awarded after SMASE training

Table 4.13 shows how relevant the certificate awarded after SMASE training

<table>
<thead>
<tr>
<th>Relevancy of the SMASE certificate</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very relevant</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Relevant</td>
<td>30</td>
<td>59</td>
</tr>
<tr>
<td>Irrelevant</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Very irrelevant</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.13 shows that thirteen 25% said it was very relevant, thirty 59% said it was relevant, four 13% irrelevant, and another four 13% said it was very irrelevant. Fewer numbers of the teachers thought it irrelevant as there was no immediate advancement from the programme.
4.5.7 If relevant how it has helped the teacher to progress in profession

- Made it easier
- Helped when doing proficiency test
- Helped further education

Figure 4.9 Relevancy of the certificate in helping the teacher to progress

From figure 4.9, 60% said it helped them when they did proficiency tests and 20% said it made easier to advance and another 20% in furthering their education.

4.5.8 Perception of science and mathematics trainer in a cluster for 5 days of the SMASE inset

Figure 4.10 Perception of Science and Mathematics trainers in 5 days SMASE inset
From the figure 4.10 The majority of the respondents 61% said perception of science and mathematics trainer in a cluster for 5 days of the SMASE inset was effective, 19% said it was very effective, 14% ineffective and 6% very ineffective. The teachers stated it was effective and appreciated it.

The lack of enough resources of time and other resources makes it a challenge in balancing the training programmed within a given time frame. For those that require more time in the training feel disadvantaged while the early learners are comfortable with the methods used.

4.5.9 Expectations in SMASE Programme

The table 4.14 shows the results of the expectations in the SMASE programme from the teachers.

<table>
<thead>
<tr>
<th>Expectations</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Things</td>
<td>21</td>
<td>42</td>
</tr>
<tr>
<td>Promotion</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Certificate</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Improve Teaching</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

From the table 4.14 majority of the teachers twenty one (42%) expected new things, twenty (40%) a certificate after training, six (10%) to improve their teaching and four (8%) to improve on their teaching. The expectation to learn new things and earn a
certificate was higher as this would encourage the teachers in their profession. Promotion is based on certificates and posting good performances in the subjects that one taught.

4.6 How the teachers thought about actualization

4.6.1 Introduction

Actualization refers to perceptions and attitudes that one acquired that were geared towards realization of the goals of the SMASE trainings. The training was required to change the perceptions and thinking of the teachers as concerning science and mathematics as difficult subjects where the pupils would not get good grades. The approach was to let the teachers learn and internalize the training and in forming groups the teachers would present a lesson to the others for critiquing. This would assist the teacher to improve in the areas they were deficient and help in the teaching process in their schools.

4.6.2 Management of Actualization

Figure 4.11 shows the results from the teachers on management of actualization.

![Figure 4.11 Management of Actualization](image)
Figure 4.11 shows that the majority of the teachers 71% said it was good and 16% very good and 5% and further 2% said poor and very poor respectively. The teachers appreciated the actualization process that helped to change their attitudes.

Their reasons were that the pupils took it casually and were not available. Pupils need motivation to enjoy what they are learning and a good teacher will work hard to see that pupils are serious in their work and also understand the psychology of the learner that whatever the teacher teaches is relevant.

4.6.3 Whether the Topic of Actualization was clear to them

Table 4.15 shows the responses of whether the topic of actualization was clear to them.

<table>
<thead>
<tr>
<th>Whether the topic of actualization was clear</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>41</td>
<td>80</td>
</tr>
<tr>
<td>No</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

The table 4.15 shows that majority of the teachers representing 80% said the topic of actualization was clear to them and 20% said it was not. The subject of actualization was new and many were able to acquire the skill and attitude.

New frontiers are a challenge to those who have one line of thinking and may not be open to new ideas. Those who stick long in one subject may feel they do not want to learn other things slightly out of the course though helpful.
4.6.4 Whether Rooms were Conducive for Actualization

The table 4.16 shows the results of whether the rooms were conducive for actualization.

<table>
<thead>
<tr>
<th>Whether rooms were conducive for actualization</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>42</td>
<td>83</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>51</td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The table 4.16 shows that the majority of the teachers representing 83% said rooms were conducive for actualization and 17% said they were not. Facilities provided will always be restricted to the resources available.

The place was crowded and few facilitators that were available could only manage by putting all the teachers in one room. If the number was higher it would have been prudent to divide the group.

4.6.5 Preparation for Actualization by SMASE Teachers

Figure 4.12 show the results of preparation for actualization of the SMASE teachers.
Figure 4.12 shows that those who responded that preparation for actualization was adequate were 59%, very adequate 22%, and 11% inadequate and not adequate 8%.

4.6.6 If not Reasons for not being Adequate

The responses on the reasons why the who stated the preparation for actualization was not adequate are presented in the table 4.17 below

<table>
<thead>
<tr>
<th>Reasons for not being adequate</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficult areas</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>Not enough time for difficult areas</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.17 shows the reasons given for not being adequate were 60% said there were difficult areas, and 40% there was not enough time for difficult areas.

4.6.7 Whether Actualization helped Participants

The researcher sought to know whether actualization helped participants, and the results are presented in table 4.18.

<table>
<thead>
<tr>
<th>Whether actualization helped participants</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>40</td>
<td>79</td>
</tr>
<tr>
<td>No</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.18 shows that the majority of the teachers representing 79% said actualization helped the participants and 22% said it did not. The benefits the teachers got practice in the subjects and learnt more from their fellow teachers. Teachers sharing same subjects would be better if they met often and addressed issues that face them. Such forums are rare and experiences are not shared which is important as enhances knowledge.

4.7 How the science and mathematics teachers perceived the ASEI-PDSI paradigm in the SMASE programme

Pedagogy training for the adults required the employment of tactics that help the adult leaner to be able to benefit from the training.

4.7.1 Appreciation of ASEI-PDSI Approach in Teaching Science and Mathematics in School

Table 4.21 shows the appreciation of ASEI-PDSI approach in teaching science and mathematics in school.

Table 4.19 Appreciation of ASEI-PDSI Approach in Teaching Science and Mathematics in School

<table>
<thead>
<tr>
<th>Appreciation of ASEI-PDSI approach</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39</td>
<td>77</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.19 shows majority of the teachers representing 77% appreciated the ASEI-PDSI and 23% did not. The approach was helpful as more than one method of training.
was used. The pupils learnt more because it involves demonstrating. Audio, visual and touching were methods used in the approach.

In training when more than one method is used the learners understand better. A child who is secure and learns well is the one allowed to explore experiment and discover things on their own. This makes learning more effective.

### 4.7.2 Whether the Activities of in ASEI lesson were Helpful to the Teacher

Table 4.20 shows the result of whether the activities of in ASEI lesson were helpful to the teacher.

<table>
<thead>
<tr>
<th>Whether the activities of in ASEI lesson were helpful</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>38</td>
<td>75</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

The young learner unlike the adult understands better as more senses are involved. Retention is also high unlike when only audio methods are used.

### 4.7.3 Whether the Experiments in ASEI lesson plans benefited one as Science and Mathematics Teacher

The table 4.21 shows the findings of whether the experiments in ASEI lesson plans benefited one as science and mathematics teacher.
Table 4.21 Whether the Experiments in ASEI lesson plans benefited one as Science and Mathematics Teacher

<table>
<thead>
<tr>
<th>Whether the experiments in ASEI lesson plans were beneficial</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47</td>
<td>92</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.21 shows majority of the teachers representing 92% they benefited as science and mathematics teachers and 9% the experiments did not affect. The experiments were beneficial as the learner could also try and achieve the same results on his own.

4.7.4 How the experiments were beneficial to the teacher

Table 4.22 shows the results of how the experiments were beneficial to the teacher

Table 4.22 How the experiments were beneficial to the teacher

<table>
<thead>
<tr>
<th>Benefits to the teacher</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce cost</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Create interest and is easier to train</td>
<td>26</td>
<td>51</td>
</tr>
<tr>
<td>Teacher prepares</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.22 shows that the teacher was helped by the experiments by creating interest and found it easier to train as indicated by 51%, 25% said it reduced the cost and 24% it helped the teacher to prepare. Improvisation creates interest and its being cheap allows even the learner to develop the same alone thus improving on creativity.
4.7.5 How improvisation of materials helped to teach Science and Mathematics

Improvisation of materials helped to teach science and mathematics. 51% said it made it easier for the pupil as it creates interest, 30% said the materials found locally and were cheap and reduced the cost while 9% said it promoted preparation by the teacher. Pedagogical skills, and upgrade content mastery in the respective disciplines.

Unlike the existing situation in most classrooms, there is a growing belief that innovative practices are those which promote inquiry-based learning where students take responsibility for their learning, and acquire problem-solving skills necessary in and out school.

4.7.6 Perception in the planning of an ASEI-PDSI lesson plans

Table 4.23 shows the perception in the planning of ASEI-PDSI lesson plan the results are shown in the table below.
Table 4.23 Perception in the planning of an ASEI-PDSI lesson plans

<table>
<thead>
<tr>
<th>Perception of the lesson plans</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Time consuming</td>
<td>31</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.23 shows that the perception in the planning of ASEI-PDSI lesson plans from the teachers was that 70% said it was time consuming while 30% said it was simple. The teachers said the lesson plans were more time consuming as they required the teacher to organize the materials for the training.

### 4.7.7 How the Teachers Actualized ASEI-PDSI lesson plans in their Cluster

The researcher sought to find out how the teachers actualized the ASEI-PDSI lesson plans in their cluster.

Table 4.24 How the Teachers Actualized ASEI-PDSI lesson plans in their Cluster

<table>
<thead>
<tr>
<th>Actualization of ASEI-PDSI lesson plans</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>45</td>
<td>88</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.24 shows that the majority of the teachers representing 88% actualized their lesson plans and 12% did not. The response shows that the trainees actualized the ASEI-PDSI approach well.
4.7.8 How they found Discussion of the ASEI-PDSI lesson after Teaching in the Classroom

![Bar chart showing the results of the discussion of the ASEI-PDSI lesson after teaching in the classroom. 49% said it was relevant, 24% very relevant, 19% irrelevant, and 8% very irrelevant. Discussion raises important aspects that could not have been stressed during the class work.](image)

**Figure 4.14 Discussion of the ASEI-PDSI Lesson after Teaching in the Classroom**

Figure 4.14 shows the results of the discussion of the ASEI-PDSI lesson after teaching in the classroom, 49% said it was relevant, 24% very relevant, 19% irrelevant and 8% very irrelevant. Discussion raises important aspects that could not have been stressed during the class work.

The learners learn more than if they had been on their own. It reinforces the teaching. Besides networking amongst teachers during INSET and lesson demonstrations, there were potential gains in regional networks through sharing of experiences and good practices. Similarly, one of the specific goals was to enhance exposure of staff through conferences, seminars and partnerships.

4.7.9 If relevant why it was so

The reasons why the discussions of the ASEI-PDSI lessons after teaching in the classroom were relevant, the reasons are shown below in the table 4.25.
Table 4.25 why it was relevant

<table>
<thead>
<tr>
<th>Why relevant</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No time wasted</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>Pupils enjoy</td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>Helps learners understand better</td>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>Learners involved</td>
<td>10</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>37</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.25 shows the reasons why the ASEI-PDSI lesson discussion was relevant of those that said it was relevant 28% said the pupils enjoyed, 27% learners were involved, 24% it helped the learners to understand better and 21% no time was wasted.

4.7.10 Whether the ASEI-PDSI approach helped science and Mathematics Teacher to teach Difficult Subjects

The table 4.26 whether the ASEI-PDSI approach helped science and mathematics teacher to teach on the difficult subjects.

Table 4.26 Whether the approach helped to teach difficult subjects

<table>
<thead>
<tr>
<th>Whether the ASEI-PDSI approach helped</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>48</td>
<td>94</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.26 shows that the majority of the teachers representing 94 % responded stating that ASEI-PDSI approach helped them as science and mathematics teachers in
teaching difficult subjects and 6% responded stating it did not assist. The approach helped the teachers in teaching the subjects. The method used audio and visual aids in the teaching).

4.7.11 How the Approach Assisted the Teacher

Figure 4.15 shows the approach helped to tackle difficult topics by creating a 54% said better understanding, 29% there was adequate preparation, 22% there was a practical orientation, and 16% it created more interest. Topics which were difficult were simplified by adequate preparation and practical orientation. This created more interest in the subjects taught.

4.8 How the teachers perceived the curriculum and instruction in the implementation of the SMASE program

4.8.1 Introduction

The curriculum and instructions are important as part of the SMASE programme. There was a need to study whether the programme added more load to the teachers and whether the teachers were able to complete the syllabus on time.
4.8.2 Whether SMASE Programme helped the Science and Mathematics Teacher Implement Curriculum in School

The researcher sought to find out whether the SMASE programme helped the science and mathematics teachers to implement curriculum in school. The results of the findings are shown in the table 4.27.

<table>
<thead>
<tr>
<th>Helped implement curriculum</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47</td>
<td>92</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.27 shows that the majority of the teachers representing 92% responded that the programme helped the science and mathematics teachers implement the curriculum in school and 8% responded it did not. The curriculum was implemented as required.

4.8.3 If yes how it helped the science and mathematics teachers implemented curriculum in school

Data was collected and analyzed on how the programme helped the science and mathematics teachers especially in the areas stated and the results of the findings are presented in the table below 4.28.
Table 4.28 how it helped the science and mathematics teachers implemented curriculum in school

<table>
<thead>
<tr>
<th>How it helped the science and mathematics teachers implemented curriculum</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding is easier</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td>Teachers plan</td>
<td>19</td>
<td>37</td>
</tr>
<tr>
<td>Use two methods ASEI-PDSI</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>47</td>
<td>100</td>
</tr>
</tbody>
</table>

From the table 4.28 of those who said yes 58% said it made understanding easier, 37% it made teachers to plan and 5% it used two methods ASEI and PSDI. When the applications in the new methods were employed, the learners understood it better and therefore the curriculum implementation was easier.

4.8.4 Whether SMASE approach helped the teacher complete the syllabus on time

The researcher sought to find out whether the approach helped the teacher to complete the syllabus in time. The results are presented in the table below.

Table 4.29 Whether SMASE approach helped the teacher complete the syllabus on time

<table>
<thead>
<tr>
<th>Completion of syllabus</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>35</td>
<td>69</td>
</tr>
<tr>
<td>No</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.29 shows majority of the teachers representing 69% stated it helped the teacher complete the syllabus on time and 32% said it did not affect. The teachers were able to cover the syllabus in time because approach it was faster to teach and learners were more comfortable with the system than before.

4.8.5 If no why they thought SMASE Approach did not help one to complete the Syllabus

The researcher sought to know why the SMASE approach did not help the teachers to complete the syllabus.

Table 4.30 why they thought SMASE Approach did not help one to complete the Syllabus

<table>
<thead>
<tr>
<th>Why they thought the SMASE approach did not help one to complete the syllabus</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A lot of time needed</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td>Too many learners</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Demonstrations required more time</td>
<td>5</td>
<td>31</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>100</td>
</tr>
</tbody>
</table>

From the table 4.30 of those who said no, 50% said a lot of time was required, 31% demonstrations required more time and 19% there were too many learners. A small proportion of the teachers did not complete the syllabus on time. The reasons advanced that more time was required could be managed by learning how the other teachers were able to overcome the problem.
4.8.6 If there were Topics found Difficult to teach using SMASE Approach

The researcher collected and analyzed data to find out if there were difficult topics to teach and the findings are presented in the table 4.31.

Table 4.31 If there were Topics found Difficult to teach using SMASE Approach

<table>
<thead>
<tr>
<th>Topics difficult to teach using SMASE approach</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>21</td>
<td>42</td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>58</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

From the table 4.31 when asked whether there were topics found difficult to teach using SMASE approach 58% said there were and 42% there no topics. In some topics experiments relating to the use of the approach would be difficult.

4.8.7 The Topics Found Difficult to teach in their area of Specialization and why

Figure 4.16 shows the results of the topics that were difficult to teach in their area of specialization.

![Graph showing difficult topics](image)

Figure 4.16 Difficult to teach in their area of Specialization
From figure 4.16 those who indicated there were topics difficult to teach using the SMASE approach 43% said properties of matter, and 19% for graphs and proportion, volume and scale drawing each.

4.8.8 Whether the pupils Background and Teachers Environment affect the Syllabus Coverage

Table 4.32 shows the findings of whether the pupils background and teachers environment affect the syllabus coverage.

<table>
<thead>
<tr>
<th>If pupils background and teachers environment</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>affected syllabus coverage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>31</td>
<td>62%</td>
</tr>
<tr>
<td>No</td>
<td>20</td>
<td>38%</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100%</td>
</tr>
</tbody>
</table>

From the table 4.32 majority of the teachers representing 62% said pupil’s background and teachers’ environment affected the syllabus coverage and 38% said it did not affect. The environment that one comes from affected syllabus coverage.

Some of the learners did not concentrate on their work because of problems relating to their background.

The child development consists of health, mental, social, emotional and spiritual wellbeing of the child. Some of the factors that hinder children are poverty when parents are not able to provide for the basic needs.
4.8.9 If yes how it affected the science and mathematics coverage of the syllabus

Table 4.33 shows the results of those who said that the background of the pupils affected the syllabus coverage. The reasons are presented in the table below.

<table>
<thead>
<tr>
<th>How it affected the science and mathematics coverage of the syllabus</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No materials</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>You go back to teach</td>
<td>14</td>
<td>45</td>
</tr>
<tr>
<td>Does not cover work</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Absenteeism</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>31</td>
<td>100</td>
</tr>
</tbody>
</table>

From the table 4.33 the teachers and pupils' background affected the learning of the science and mathematics coverage of the syllabus, 45% said one had to go back to teach, 29% there were no materials, 13% said there was no time to cover the work and another 13% cited absenteeism.

4.8.10 Whether they Found Enough time to Assess their Pupils after the Lesson

Table 4.34 shows the results of whether they found enough time to assess their pupils after the lesson.

<table>
<thead>
<tr>
<th>Whether they found enough time to assess</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27</td>
<td>54</td>
</tr>
<tr>
<td>No</td>
<td>24</td>
<td>47</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.34 shows majority of the teachers representing 54% found enough time to assess their pupils while 47% didn’t find time. Assessment is required for the work done and to assess the progress assessment required to be done. Time has to be created as one teaches.

4.8.11 If no, what the Teachers thought about the forms of Assessment used

Table 4.35 shows the results from data analyses of those teachers who said they did not have enough time to assess the pupils.

Table 4.35 What the Teachers thought about the forms of Assessment used

<table>
<thead>
<tr>
<th>What the teachers thought About the forms of assessment</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra time required</td>
<td>17</td>
<td>71</td>
</tr>
<tr>
<td>Small groups better</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Too clustered</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24</td>
<td>100</td>
</tr>
</tbody>
</table>

The table 4.35 shows that of those who said no, when asked on forms of assessment 71% said extra time was required, 17% said small groups were better and 12% that it was too clustered. The teachers thought that more time was required and that small groups were better. This is true but since the resources do not allow the clusters were used.
4.8.12 What the Teachers thought that the Numbers of Pupils in the Class affect the Syllabus Coverage in the Science and Mathematics Subjects

Table 4.36 shows the responses of the teachers on what they thought about the number of pupils in the class and whether they could affect the syllabus coverage in the science and mathematics subjects.

<table>
<thead>
<tr>
<th>If numbers affected syllabus coverage</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27</td>
<td>54</td>
</tr>
<tr>
<td>No</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.36 shows the majority of the teachers representing 54 % thought the numbers of pupils in the class affected the syllabus coverage and 27 % said the syllabus did not affect. Numbers in the class affect because the trainer will not have eye contact with the learner. The environment under which the child is living may influence academic performance and affect the syllabus coverage.

The teachers thought new approach came with new demands increasing the workload. The free primary education implementation caused most parents to send children to school because there was no fees payment. The number of pupils increased while the number of teachers was not increased.

4.9 Appendix B

This section involved science and mathematics trainers in public primary schools interview schedule. The study sought to know whether the trainers were sensitized,
how they perceived the SMASE programme and the strengths and challenges of the SMASE programme

4.9.1 Whether the trainers were sensitized on the introduction of the SMASE programme

The researcher sought to investigate whether the trainers were sensitized on the introduction of the SMASE programme. The results of the findings are shown in the table 4.37. From the table 4.37 three (75%) were not sensitized and one (25%) were well sensitized.

Table 4.37 Sensitization on the introduction of the SMASE programme

<table>
<thead>
<tr>
<th>Whether sensitized on the introduction of the SMASE programme</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well sensitized</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Not sensitized</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

4.9.2 How they Perceived the SMASE Programme

The researcher sought to know how the teachers perceived the SMASE programme. The results obtained are shown in the table below.

Table 4.38 Perception the SMASE Programme

<table>
<thead>
<tr>
<th>They Perceived the SMASE Programme</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Practical</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Relevant</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

From the table 4.38 all the teachers perceived the SMASE programme as important 100%, practical (100%) and those who considered it relevant as 100%.
4.9.3 The strength and challenges of the SMASE programme

The researcher sought to know from the trainers of the SMASE programme the challenges that they were faced with. The results are presented in the table 4.39.

Table 4.39 The strength and challenges of the SMASE programme

<table>
<thead>
<tr>
<th>Strength and challenges of the SMASE programme</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical approach</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Interesting to the learner</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Encouraged facility and material use</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Good rapport between teacher and pupil</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Create positive attitude to the learner</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Teamwork among the learners</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Improves creativity and accuracy</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

From the table the strengths of the SMASE program were that it had a 100% practical approach 75% interesting to the learner, 75% that it encouraged facility and material use, 75% it created a good rapport between the teacher and the pupil, 100% it created a positive attitude to the learner and another 75% said it created teamwork among the learners and 100% that it improved creativity and accuracy of the learner.

From the table the approach was preferred because the learners found it interesting and thus were able to learn better. There was use of more than just one sense as the more senses involved the better for the learner. The learners under the new approach were able to work together creating teamwork which reinforced the teaching.
4.9.4 Challenges

Table 4.40 Challenges

<table>
<thead>
<tr>
<th>Challenges</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not enough resources</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Time not adequate</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Large classes</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

The challenges cited were 100% said the resources were not enough and 100% of the teachers said there were large classes. Large classes resulted from the free primary education. The number of trainers was not proportionately increased at the same level and the pupil teacher ratio remains high.

4.9.5 Recommendations to Sustain and Improve the SMASE Programme

The table 4.41 shows the recommendations to sustain and improve the SMASE Programme

Table 4.41 Recommendation to sustain and improve the SMASE programme

<table>
<thead>
<tr>
<th>Recommendations to sustain and improve the SMASE programme</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use cluster centre’s as advisory meeting centre’s for teachers</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Encourage use of ASEI-PDSI approach</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Train more teachers</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Other stakeholders to play their role</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

From the table 84% of the teachers responded that the use of the cluster centre as an advisory meeting for teachers, 84% encouraged use of ASEI-PDSI approach, and 88% train more teachers and 78% that other stakeholders to play their
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the researcher presents the summary of the study findings, a discussion of the findings and recommendations based on those findings. Suggestions of other related studies that could be carried out in future are presented. The purpose of the study was to investigate the perception of public primary school teachers on the implementation of SMASE programme. Given below is a summary of the findings of the study.

5.2 Summary and discussion of the Study Finding

Below is a presentation of a summary of the major findings of the study.

5.2.1 Significance of the Study

The results from the study show that the expectations of the teachers were to improve their careers through promotion, getting a certificate, improve their teaching and learn new things. The teachers expected to improve their work and advance in career as more responsibility was added to them. Efforts to improve performance in science and mathematics will be achieved through trained teachers. This will target them as curriculum innovators and implanters. Improving pupils learning will depend on teachers with the right attitudes and beliefs toward teaching and learning and who possess the right content different from what it is usually in most classrooms.
5.2.2 Training in the Cluster Centres

The training was helpful to the SMASE teachers because it helped them acquire skills and attitudes that helped them to improve their performance in the class. The training included addressing pertinent issues in the science and mathematics where performance was low among the pupils. To address the problem the SMASE teachers training programme was rolled out to refresh and also add more skills and change the attitude of the teachers. The trainers were competent, well prepared and were appreciated and respected. The relationship between the trainers and the teachers was very good.

The perception of science and mathematics teachers was that the programme was effective and appreciated. Actualization management was very well as 71% of the teachers said it was very good. The topic of actualization was clear to the teacher and that the rooms for the training were conducive for actualization. Actualization helped the participants by allowing them to practice and acquire new knowledge.

5.2.3 Teaching Methodology

The ASEI-PDSI approach in teaching science and mathematics in school was appreciated by the teachers. The approach was appreciated because it made the pupil understand better by demonstration, it was pupil centered and helped the learner activities in ASEI more helpful to the teacher because the teacher was able to prepare before the class. The teachers stated that a lot of time was taken to prepare but the pupils understood the science and mathematics better. Experiments helped the pupils to relate the theory to the practical aspect and understanding was better.
5.3 Recommendations

The researcher made the following recommendations;

i. SMASE INSETS should be carried out in one of the holidays in the year,

ii. Head teachers and stakeholders to support science and mathematics teachers in provision of teaching materials,

iii. MoEST and TSC to employ more teachers and motivate SMASE trainees by giving promotions, payment and certificates.

iv. The positive perception of teachers towards science and mathematics should be made use of to improve the teaching of these subjects.

v. Science and mathematics teachers should be in-serviced on use of learner centered methods of teaching and learning such as role play, project method, facilitated discussions, science walk and practical work.

vi. There is need for in-service on delivery of lessons so as to adequately incorporate the following practices:-

   o Encouraging learners to give their hypotheses.
   o Encouraging learners to give their observations or results in experiments.
   o Facilitating the growth of process skills.
   o Choosing appropriate and effective teaching/learning resources.
   o Bridging of activities to concepts.
   o Guiding practical activities.
   o Dealing with learners' questions, misconceptions and reinforcing at each step.
   o Guiding learners to recapitulate the main points of the lesson and give follow up activities.
5.4 Suggestions

Based on the findings of the study, the researcher wishes to make the following recommendations:

1. The study was limited to a sample drawn from Kirinyaga West District. Other studies could be carried out in other parts of Kirinyaga County and larger parts of Kenya to test the replicability of the findings.

2. Further studies may be carried out to establish the perception of pupils learning science and mathematics in the public primary schools.

3. The study was carried out in public primary schools. Another study may be carried out in private primary schools to establish whether similar studies could be obtained there.

5.5 Conclusion

This study was aimed to investigate the perception of public primary school teachers in the implementation of SMASE programme. The study was carried out using data collected from science and mathematics teachers in public primary schools and trainers of Ndia Division in Kirinyaga West District.

From the findings of the study the researcher concluded that ASEI / PDSI practices lesson study were time consuming and costly. Teaching aids needs to be improvised daily using locally available materials and that pupils needs to be punctual and active in their group work discussions and assignments. The findings have been discussed and recommendations given which if implemented would lead to a better performance in science and mathematics subjects and thus improving academic performance in public schools.
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SMASE Project (2010), *Rationale for INSET*

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APPENDIX A

Questionnaire for the SMASE Teachers

Introduction

This questionnaire is intended to collect information regarding the perception public primary teachers have on the implementation of SMASE programme. You are requested to respond to the items as honestly as possible. Kindly do not write your name or that name of your school anywhere in the questionnaire. The information you give will be held with a lot of confidentiality and used only for the purpose of then study.

Where appropriate indicate your response by use of a tick or by writing your answer in the space provided.

SECTION A: Background information

1. Your gender
   Male ( )       Female ( )

2. How were you selected to SMASE program?

3. How did the SMASE information reach you at school?
4. How did you feel after joining SMASE program? ............................................................
...........................................................................................................................................
...........................................................................................................................................

5. What are your expectations in SMASE programme? ......................................................
...........................................................................................................................................
...........................................................................................................................................
...........................................................................................................................................

6. How did you perceive the attendance of participants at the start of SMASE INSETS? ....
...........................................................................................................................................
...........................................................................................................................................
...........................................................................................................................................
...........................................................................................................................................

SECTION B: CLUSTER CENTERS

1. a) Is your school a cluster center?
   Yes ( ) No ( )
   b) If no, how do you get to the cluster center from your school? .........................
...........................................................................................................................................

2. a) Do you get to the cluster center on time?
   Yes ( ) No ( )
   b) If no, why don’t you arrive on time? ....................................................................
...........................................................................................................................................
3. a) How long do you take to be in the cluster in a day? .................................................................

...........................................................................................................................................................

b) Do you find this time beneficial to you as a science and mathematics teacher?  
Yes ( )  No ( )

4. a) Are there enough facilities to accommodate the science and mathematics cluster centers?
Yes ( )  No ( )

b) If no, how does this affect the learning of science and mathematics in your school?  
........................................................................................................................................................
........................................................................................................................................................
........................................................................................................................................................

5. a) Is time well managed in the cluster centers?
Yes ( )  No ( )

b) If yes, how do you think time is well managed? .................................................................
........................................................................................................................................................
........................................................................................................................................................

6. a) Are there specialization groups in the cluster centers?
Yes ( )  No ( )

b) If yes, how do you perceive these groupings? .................................................................
........................................................................................................................................................
c) How do you perceive the group presentation in your subject area? 


7. a) Are the groups well monitored?  

Yes ( )  No ( )

b) If yes, how are they monitored? 


Training

1. a) Do you take the training given by the SMASE trainers in the INSET?  

Yes ( )  No ( )

b) If no, why don’t you like the training given? 


2. a) Do you find the SMASE trainers competent?  

Yes ( )  No ( )

b) If no, why do you think they are not competent? 


c) How do you find the relationship between the trainers and participants?  

Very good ( )  Good ( )  Poor ( )  Very poor ( )

3. a) Does the duration of the course interfere with your programmes?  

Yes ( )  No ( )
b) If yes, how does it affect your programmes? .........................................................

.................................................................................................................................

.................................................................................................................................

4. a) Are the instructions given by the trainers clear to you?

Yes ( ) No ( )

b) If no, why do you think they aren’t clear? .................................................................

.................................................................................................................................

.................................................................................................................................

5. a) How do you find the co-ordination of the teamwork in the SMASE INSET?

Relevant ( ) Very relevant ( )

Irrelevant ( ) Very irrelevant ( )

b) If relevant, how do you think the teamwork benefits the teachers in the SMASE programme? ...................................................................................................................

.................................................................................................................................

.................................................................................................................................

6. a) How relevant is the certificate awarded after SMASE training?

Relevant ( ) Very relevant ( )

Irrelevant ( ) Very irrelevant ( )

b) If relevant, how does it help you as a teacher to progress in the profession?

.................................................................................................................................

.................................................................................................................................

.................................................................................................................................
7. a) How do you perceive the science and mathematics trainers in a cluster for the five days of the SMASE INSET?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Very effective</td>
<td>( )</td>
<td>Effective</td>
</tr>
<tr>
<td>Ineffective</td>
<td>( )</td>
<td>Very ineffective</td>
</tr>
</tbody>
</table>

b) If ineffective, why do you think they are? .................................................................
                                                                                          .................................................................
                                                                                          .................................................................

Actualization

1. a) How do you find the management of the actualization?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>( )</td>
<td>Good</td>
</tr>
<tr>
<td>Poor</td>
<td>( )</td>
<td>Very poor</td>
</tr>
</tbody>
</table>

b) If poor, why do you think that the management is poor? .............................................
                                                                                          .................................................................
                                                                                          .................................................................

2. a) Do you find the topic choice for the actualization clear to you?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>( )</td>
</tr>
<tr>
<td>No</td>
<td>( )</td>
</tr>
</tbody>
</table>

b) If no, why do you think the topic is not clear to you? .............................................
                                                                                          .................................................................
                                                                                          .................................................................

3. a) Do you find the rooms conducive for actualization?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>( )</td>
</tr>
<tr>
<td>No</td>
<td>( )</td>
</tr>
</tbody>
</table>
b) If no, why do you think they are not conducive?

4. a) How do you find the preparation for actualization by the SMASE teachers?

Very adequate ( ) Adequate ( )
Inadequate ( ) Not adequate ( )

b) If not adequate, why do you think the preparations are not adequate?

5. a) Does the actualization help the participants?

Yes ( ) No ( )

b) If yes, how does it benefit you as the science and mathematics teacher?

-----------------------------------------------

Pedagogy

1. a) Do you appreciate ASEI-PDSI approach in the teaching of science and mathematics in your school?

Yes ( ) No ( )

b) If yes, why do you appreciate the approach?

-----------------------------------------------
2. a) Do you find the activities in ASEI lesson helpful to you as a teacher?
   
   Yes ( )  No ( ) 

   b) If no, why do you think they are important to you as a science and mathematics teacher?
   ..............................................................................................................................................................
   ..............................................................................................................................................................
   ..............................................................................................................................................................

3. a) Do the experiments in the ASEI lesson plans benefit you as the science and mathematics teacher?
   
   Yes ( )  No ( ) 

   b) If yes, how beneficial are they to you?
   ..............................................................................................................................................................
   ..............................................................................................................................................................
   ..............................................................................................................................................................

4. How does the improvisation of materials help you teach science and mathematics?
   ..............................................................................................................................................................
   ..............................................................................................................................................................

5. a) How do you perceive the planning of an ASEI-PDSI lesson plan?
   
   Simple ( )  Time consuming ( ) 

   b) If time consuming, why do you think it consumes time?
   ..............................................................................................................................................................
   ..............................................................................................................................................................
   ..............................................................................................................................................................
6. a) Do you actualize the ASEI-PDSI lesson in your cluster?
   Yes ( )  No ( )

   b) If yes, how do you perceive the actualization of the ASEI-PDSI lesson in actual classroom situation?

7. a) How do you find the discussion of the ASEI-PDSI lesson after teaching in the classroom?
   Relevant ( )  Very relevant ( )
   Irrelevant ( )  Very irrelevant ( )

   b) If irrelevant, how do you think so?

8. a) Does the ASEI-PDSI approach help you as a science and mathematics teacher to teach difficult topic?
   Yes ( )  No ( )

   b) If no, what could be the possible reason(s)?
9. a) Does the ASEI-PDSI approach help you as a science and mathematics teacher to teach difficult topics?
   Yes ( )   No ( )

   b) If yes, how does it assist you tackle this?

Curriculum and instruction

1. a) Does the SMASE programme help the science and mathematics teachers implement curriculum in the school?
   Yes ( )   No ( )

   b) If yes, how does it help the science and mathematics teachers implement curriculum in the school?

2. a) Does the SMASE approach help science and mathematics teachers complete syllabus on time?
   Yes ( )   No ( )

   b) If no, why do you think SMASE approach does not help you complete the syllabuses?
3. a) Are there topic(s) you find difficult to teach using SMASE approach?
   Yes ( )  No ( )

   b) Which topic(s) do you find difficult to teach in your area of specialization and why?

4. a) Does the pupils’ background and teachers’ environment affect the syllabus coverage?
   Yes ( )  No ( )

   b) If yes, how does it affect the science and mathematics coverage of the syllabus?

5. a) Do you find enough time to assess your pupils after the lesson?
   Yes ( )  No ( )

   b) If no, what do you think about the forms of assessment used?
6. a) Do you think the number of pupils in the class can affect the syllabus coverage in the science and mathematics subjects?

Yes ( ) No ( )

b) If yes, why do you think so? ...........................................................................................................
...........................................................................................................
...........................................................................................................
...........................................................................................................
APPENDIX B

A science and mathematics trainers in the public primary schools

interview schedule

1. Were public primary school science and mathematics teachers' sensitized on the introduction of SMASE programme?

2. How do you perceive SMASE programme as a science and mathematics teacher?

3. What are the strength and challenges impacted by the SMASE programme?

4. What are your recommendations to sustain and improve the SMASE programme?