AN EVALUATION OF ASEI- PDSI TEACHING APPROACH IN MATHEMATICS IN PUBLIC PRIMARY SCHOOLS IN KISUMU WEST SUB COUNTY, KENYA

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DECLARATION

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

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This research project is submitted for examination with our approval as the University Supervisors.

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DEDICATION

This research project report is dedicated to my mother Mrs. Dorothy Atieno for her encouragement, patience, perseverance and for her financial support throughout my studies.

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ABBREVIATIONS AND ACRONYMS

ASEI	Activity Student Experiment and Improvisation
CEMASTEA	Centre of Mathematics, Science and Technology in Africa Eastern, Central and South Africa.
INSET	In-service Education and Training
JICA	Japan International Cooperative Agency
KNEC	Kenya National Examination Council
MoE	Ministry of Education
PDSI	Plan, Do, See and Improve
PTTCs	Primary Teachers Training Colleges
	Secondary Education
SMASE	Strengthening Mathematics and Science Education
SPRED	Strengthening Primary Education Project

ABSTRACT

The purpose of the study was to evaluate the ASEI-PDSI teaching approach in public primary schools in Kisumu West Sub- County, Kenya. The study aimed to achieve the following objectives; to establish how the use of ASEI-PDSI approach, if there was a significant relationship between teachers' attitudes and the level of implementation of ASEI-PDSI classroom approach, to establish if there was significant relationship between head teachers' supervision of ASEI-PDSI approach and performance of mathematics in public primary schools in Kisumu West Sub-County and to examine the challenges encountered by teachers in the implementation of the ASEI-PDSI approach. This study adopted descriptive Survey design. The target population for this study was 95 public primary schools in Kisumu West Sub County, 200 mathematics teachers who have attended SMASE INSET program. A population of 3103 class 7 pupils. A sample of 29 schools was used for the study that is 30% of the 95 schools. Twenty nine (29) head teachers of the sampled schools were automatically selected, 60 teachers that is 30% of the 200 mathematics teachers and 310 pupils which is 10% of the total number of class 7 pupils. Inferential and descriptive statistics were used to interpret the data analyzed. The study findings indicated that teachers had negative attitudes on the use of ASEI/PDSI principles as opposed to their pupils whose responses reflected a lot of interest and positive energy around many aspects of ASEI/PDSI. It was also revealed that majority of teachers (63.8 percent) stated that larger classes were a challenge that influenced teachers in the implementation of ASEI-PDSI approach. Other challenges included pressure to cover the syllabus (60.4 percent) and lack of teaching and learning resources (56.9 percent). It is evident from the presented findings that successful application of ASEI/PDSI principles depends on the extent of school preparedness and more so the mathematics teacher positive attitude to implement the teaching approaches. The study therefore concludes that schools that took part in implementing ASEI-PDSI had adequate professionally trained teachers, a majority of whom had attended the SMASSE INSET but were not implementing the same. Among the recommendation of the study include; the MOE should adequately finance public primary schools to enable them acquire the necessary teaching and learning resources, facilitate workshops to build up the teachers confidence in implementing the ASEI- PDSI approach, regularly supervise the implementation of the teaching approach by the head teachers and SMASE INSETS to be frequently organized for head teachers to enable them to be more conversant with the supervision requirements of the ASEI- PDSI approach.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Mathematics is an important subject in any school curriculum in the ever changing world of science and technology .There is reliance on mathematics as a key driver of innovation in technology. A good foundation in mathematics is a prerequisite as this subject is important for advancement of careers such as computer science, medicine, anthropology, sociology, psychology and engineering specialization (Komber and Keer, 1993). A student has to perform above average in mathematics in order to be admitted in the institutions of higher learning, furthermore mathematics provides a means of communication which is powerful, concise and unambiguous; it can be used to present information in many ways not only by means of figures and letters but also through the use of tables, charts and diagrams as well as graphs and geometrical or technical drawings (Benedict, 2013).

Despite the significance attached to mathematics its performance has presented a challenge in many countries. The American Institute of Research (AIR) conducted a research to investigate performance of mathematics on 4^{th} and 9^{th} grade pupils and revealed that grade 4 pupils performed below average. Similarly, a research done by the Program for International Student Assessment (PISA) revealed that USA students are ranked below average in mathematics among the world most developed countries; this was attributed to

poor motivation towards learning of mathematics. PISA (2012).In Britain for instance there has been regular complaints of declining standards and achievements in mathematics by the press and government organizations.

In Ghana poor teacher ratio in relation to the trained teachers has been attributed to improper implementation of curriculum leading to poor performance in mathematics (Costello 1991).Research carried out by Opolot-Okurut (2008)revealed that there is poor performance in mathematics in national examinations in Uganda, this poor performance is attributed to teacher related factors which include; poor teacher attitudes towards mathematics, poor teaching methods, inadequate teaching experience and teacher's weak academic background.

Mathematical skills are a basic requirement for everyday life but students continue to perform poorly in mathematics in examinations. This is evident as some candidates cannot tackle mathematical problems meant for lower primary levels; candidates also find it difficult to handle questions that require higher thinking abilities such as those that involve problem solving, evaluation and applications. Some of the factors leading to poor performance in mathematics are; shortage of qualified teachers, inappropriate teaching methodologies, poor mastery of content by teachers, limited teaching and learning resources, inadequate syllabus coverage, teacher pupil ratio, teacher's and pupil's negative attitude towards mathematics, low morale among teachers due to poor remuneration, Inadequate guidance by subject quality assurance

and standards officers, social cultural background of the learners and language barriers as some of the pupils cannot comprehend what is being conveyed by the teacher (Thinguri (2014).

In an attempt to improve performance in mathematics there is need for an in-service Education and Training (INSET) for teachers. Karegu (2008) points that INSET, is one of the approaches employed to up-grade teachers skills and competences throughout the world. Improving quality of education depend on improvement of quality of classroom practices (Kibe, Odhiambo and Ogwel, 2008).

The education system in Japan has succeeded because it embraces continuous in- service programs for its teachers through mentorship research groups and workshops, in- service courses are mandatory for newly recruited teachers. Wafula (2014) posits that teachers in Japan do a lesson study, where group teachers meet regularly over a period of two or three weeks to work on the design implementation testing and improvement of one or several research lessons. The government of the United States supports in service training of teacher to strengthen the quality of teaching and learning in the U.S.A they use the in-service training to supplement the brief pre- service training. In Botswana in-service training of teachers is conducted with the aim of addressing the change from teachers-centred methods to learner centred approach in teaching (Njoki (2014).

In order to improve performance of mathematics through the use of appropriate teaching methodologies and practices associations such as the Western Eastern Central and Southern Africa(WECSA) was formed to strengthen mathematics and science education and enhance learners ability through improved teacher mastery of content, pedagogical skills and enhancing both teachers and learners attitude towards mathematics and science through in-service education and training hence the SMASSE-WECSA (Nui & Wahome, 2006).

The SMASE (Strengthening of Mathematics and Sciences in Education) project is an initiative of the Kenyan Government with the support of the Japanese government through JICA (Japan International Cooperation Agency). The support from JICA is mainly providing materials and equipments, dispatching long term and short term experts from Japan to support the Kenyan personnel and sponsoring the training in other countries mainly Japan, Malaysia and Philippines for some of the Kenyan personnel. The primary component of SMASE project was prompted by the need which was during a workshop in 2006 for the principals of the PTTCs (Primary Teachers Training Colleges).The principals requested for the benefits of SMASSE be extended to the PTTCs and eventually to primary schools. It was also noted in the workshops that some of the challenges facing the teaching and learning of mathematics and sciences in secondary schools emanate from primary level (CEMASTEA manual 2010).

A needs survey was done in May and June 2009 with the main aim of establishing the needs of primary school teachers and pupils that could be addressed by the INSET, the needs that needed strengthening the most were identified as; attitude, teaching methods, mastery of content, discussion forums, in-service programmes, large classes, diversity of pupils ability, advise from Tactutors, ICT competence and work planning.

The guiding principle of SMASE INSET is ASEI (Activity based, Student centred teaching/learning resources as/when necessary). This principle is implemented based on the Plan, Do, See and Improve (PDSI) approach. The Student-centred Experiment and Improvisation (ASEI) Approach considers quality of classroom activities as critical to achieving effective teaching and learning and hence good performance in Mathematics. These are meaningful hands on (manipulation), minds-on (intellectual thinking, reasoning) mouths-on (discussions), heart-on (those that stir up the learners interest) activities. ASEI-PDSI approach stressed the need for the learners to carry out a well planned learning activity that involves seeing and improving the activity hence promoting effective learning to take place.

The ASEI-PDSI initiative focuses on teachers to reflect on their teaching strategies and acquire skills for effective teaching and efficient learning to occur. The ASEI - PDSI movement is meant to assist teachers reflect on their teaching methods and acquire skills for effective teaching that could lead to efficient learning. This is because ASEI-PDSI recognizes that meaningful

learning takes place in an environment in which students are actively engaged in focused and sequenced activities for acquisition of knowledge and skills. Every teacher is expected to undergo four cycles of INSET over a four year period. A cycle lasts ten working days, conducted once a year at district level. The first cycle emphasizes attaining a positive attitude change towards mathematics and science education among the teachers and the students. Cycle two is based on hands on activities that are designed to address specific areas considered difficult and hence not adequately handled by the teacher. Cycle three centres on actualization of hands-on activities inside the classroom situation. Cycle four emphasizes enhancing ASEI-PDSI approach in the classroom.

Despite the importance attached to mathematics and the effort made by the government of Kenya to upgrade teachers through the SMASE in-service training, public primary schools students in Kenya do not perform well in mathematics at K.C.P.E examination. This poor performance in mathematics in KCPE before and after SMASE project is indicated by the results in Table 1.1.

Table 1.1: National KCPE mean scores for mathematics year 2002-2009 before the introduction of ASEI-PDSI approach

Year	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Mean score	23.02	22.14	23.32	23.45	26.97	24.62	23.58

Examination analysis report done between the years 2002to 2009 reveal that performance of mathematic in KCPE prior to the introduction and implementation of ASEI-PDSI approach has been low as shown in Table 1.1

Table 1.2: National KCPE mean scores for mathematics year 2010-2013 after implementation of ASEI- PDSI approach

Year	**2009**	**2010**	**2011**	**2012**	**2013**
Mean score	24.78	26.90	26.16	28.15	26.43

Source: Kenya National Examination Council Report Manual 2013

Table 1.2 shows that there was a slight improvement in mathematics from the years 2009 to 2013 after the implementation of the ASEI-PDSI approach in teaching of mathematics.

Table 1.3:2004-2008 KCPE mean scores for mathematics for Kisumu Sub-Counties before the adoption of ASEI-PDSI approach

Sub county/year	**2004**	**2005**	**2006**	**2007**	**2008**	**Average**
Kisumu East	46.08	48.26	50.45	51.27	50.05	**49.22**
Kisumu West	43.02	45.67	48.44	45.47	41.67	**44.85**
Kisumu Central	55.76	53.68	57.34	56.22	53.65	**55.33**
Seme	45.67	44.27	48.32	43.27	45.32	**45.37**
Nyando	48.23	46.72	45.48	43.44	48.36	**46.45**

Table 1.3 shows that the average mathematics performance for the last five years from 2004 to 2008 in Kisumu West Sub County recorded the lowest in KCPE results compared to the other Sub Counties in Kisumu County before the implementation of the ASEI-PDSI approach in teaching mathematics.

Table 1.4:2009-2013 KCPE mean scores for mathematics for Kisumu Sub Counties after the implementation of ASEI-PDSI approach

Sub county/year	2009	2010	2011	2012	2013	Average
Kisumu East	48.08	49.26	46.77	47.96	46.69	**48.15**
Kisumu West	45.05	44.44	47.12	47.23	44.23	**45.41**
Kisumu Central	56.49	56.64	57.45	56.48	53.67	**56.14**
Seme	48.26	45.45	48.45	48.67	47.42	**47.65**
Nyando	52.34	50.21	48.61	50.67	48.76	**50.11**

Source: DEOs office Kisumu West Sub-County (2014)

Table 1.4 shows the average mathematics performance for Kisumu West Sub-County for the last five years after the implementation of the ASEI-PDSI approach, it reveals that there was a slight improvement in the average performance though the performance is still low compared to the other Sub – Counties in Kisumu County moreover, still below average with the mean score below the ideal mark of 50% which is not good performance. This raises questions as to whether mathematics teachers are fully implementing the ASEI-PDSI approach in the public primary schools in the Sub-County.

1.2 Statement of the problem

Despite the significance attached to mathematics, poor performance in the subject has been a perennial problem. The poor performance has been attributed to negative attitude among students towards mathematics and sciences; poor mastery of teaching and learning content on the part of teachers; teacher-centered teaching methodology; lack of interactive fora for teachers; failure to develop teaching and learning materials; and administrative factors (SMASSE, 2004). To upgrade the quality of mathematics and science education in primary and secondary schools and address the problem of poor performance, the Ministry of Education Science and Technology (MoEST) in collaboration with the Japanese International Corporation Agency (JICA) came up with the SMASE-INSET which focused on upgrading capacity of young Kenyans in mathematics this was through strengthening of mathematics education through INSET for teachers. The guiding principle of SMASE-INSET was the ASEI-PDSI approach which aimed at a shift from ineffective classroom practices effective classroom practices through activity/student focused approach of learning mathematics.

However, implementation of the ASEI-PDSI approach in mathematics lessons in Kisumu West Sub-County still has issues. Hence one would ask the question: To what extent have teachers been able to implement the ASEI-PDSI approach successfully? Is the approach being properly implemented in mathematics lessons by the teachers who have been in –serviced in ASEI-PDSI approach? The Table 1.3 and Table 1.4 still shows poor performance in

mathematics, not much improvement in mathematics in spite of ASEI-PDSI Implementation for teachers hence the need for this study.

1.3 Purpose of the study

The purpose of the study was to evaluate the ASEI-PDSI teaching approach in public primary schools in Kisumu West Sub- County, Kenya.

1.4 Research objectives

The study aimed to achieve the following objectives;

I. To establish if the use of ASEI-PDSI approach had influence on teaching and learning of mathematics in public primary schools in Kisumu West Sub-county.
II. To establish if there was a significant relationship between teachers' attitudes and the level of implementation of ASEI-PDSI approach.
III. To establish whether there was significant relationship between head teachers' supervision of ASEI-PDSI approach in teaching of mathematics in public primary schools in Kisumu West Sub-County.
IV. To examine the challenges encountered by teachers in the implementation of the ASEI-PDSI approach.

1.5 Research questions

i. Does the use of ASEI-PDSI approach influence the teaching and learning of mathematics in public primary schools in Kisumu West Sub-County?

ii. Does teacher's attitude influence implementation of ASEI-PDSI approach in mathematics teaching in public primary schools in Kisumu West Sub-County, Kisumu?

iii. To what extent do primary school head teachers supervise the implementation of the ASEI-PDSI approach in mathematics lessons in public primary schools in Kisumu West Sub-County, Kisumu?

iv. What are the challenges encountered by teachers during the implementation of the ASEI-PDSI approach in mathematics lessons in public primary schools in Kisumu West Sub-County, Kisumu?

1.6 Significance of the study

The findings of this study might help the Ministry of Education, Science and Technology to improve the SMASSE INSET programme. The findings might also be utilized by the Kenya Institute of Curriculum Development (K.I.C.D) in making decisions regarding what areas covered in the SMASSE INSET could be included in the pre-service teacher curriculum. In addition, school head teachers and teachers might use the findings to improve implementation of the ASEI-PDSI approach. Finally, the study might form a base on which other researchers could develop their studies.

1.7 Limitations of the study

ASEI-PDSI approach is a new teaching approach in primary schools since it was started in 2009 and therefore there is limited literature on the extent of its implementation in public primary schools. Some teachers have not completed

the full cycle of the inset programme to fully implement the ASEI-PDSI approach. To overcome this challenge the researcher used teachers who have undergone the full cycle of the INSET programme as much as possible.

1.8 Delimitations

The study was carried out in public primary schools in Kisumu West Sub-County, Kenya. The study sought to establish the extent to which teachers have actualized the ASEI-PDSI, hands on approaches and establish the extent to which the INSET has influenced performance on mathematics in primary schools in Kisumu West Sub County. The respondents were teachers in mathematics and head teachers who have undergone the SMASE-INSET and the standard eight pupils.

1.9 Assumptions of the study

According to Orodho (2005) assumption in any particular study is the unique facts presumed to be true but has not been verified yet. The assumptions were;

I. All the respondents would be cooperative and honest in responding to the questionnaire.
II. The mathematics and science teachers who had undergone the SMASE-INSET were using the ASEI-PDSI approach in their lessons.

1.10 Definition of significant terms

ASEI refers to an innovative approach of conducting mathematics lessons characterized by Activity-based, Student-centred and Experiment- oriented learning, and improvisation on the part of the teacher. This is tied with proper planning, lesson delivery, evaluation and improvement during the lesson and in subsequent lessons.

Attitude refers to learned predispositions to respond positively or negatively to SMASE project.

Evaluation refers to a systematic determination of a subject, merit, worth and significance, using criteria governed by a set of standards.

Improvisation refers to doing something with use of whatever is available or use similar version when standard commercial approaches or equipment's are insufficient.

PDSI refers to proper planning, lesson delivery, evaluation and improvement during the lesson and in subsequent lessons.

Pre-service training refers to the training of prospective teacher prior to initial basic qualification as a teacher.

Teaching approach refers to principles and methods used for instructions to be implemented by teachers to achieve the desired learning by students.

Training refers to the process by which someone is taught the skills that are needed for an art, profession or a job.

1.11 Organization of the study

The study is organized into five chapters. Chapter one of the study is introduction covering; background to the study, statement to the problem,

purpose of the study, Research objectives, Research questions, significance of the study, limitation of the study, delimitations, basic assumptions, definitions of significant terms and the organizations of the study. Chapter two is a review of related literature on evaluation on the adoption of ASEI-PDSI teaching approach while chapter three deals with Research Methodology covering Research design, target population, sample size and sampling procedures ,instruments, data collection procedure and data analysis techniques. The fourth chapter is on data presentation, analysis, interpretation and discussion. Chapter five is a summary of the study, conclusion and recommendation; Suggestions for further research was also presented.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter presents the related literature pertaining to the effective implementation ASEI-PDSI approaches in mathematics lessons. It is organized into the following themes; ASEI-PDSI approaches on teaching and learning mathematics, Teachers attitude and implementation of Strengthening Mathematics and Science Education, Head teachers' supervision of implementation of ASEI –PDSI approach and Challenges Encountered in Implementation of Innovative teaching approaches.

2.2 ASEI-PDSI approaches on teaching and learning of mathematics

The poor performance in mathematics is a major concern to the governments, parents and educators, thus calling for remedial action. Among the possible reasons for the situation is the teaching approach that is mainly teacher centered, examination oriented and poor learning that may be resulting from ineffective instruction strategy (Jeremy 2003).

The ASEI-PDSI approach is an innovative approach of teaching and learning mathematics and sciences championed by the Strengthening of Mathematics and Science in Education (SMASE) In-Service Education and Training (INSET) Programme. Through SMASE the ASEI (Activity Learner Experiment and Improvisation)-PDSI- Plan Do See and improve pedagogic paradigm is being advocated to rally mathematics teachers in refocusing their

classroom practices and hence students achievement. The ASEI lesson design considers the quality of classroom activities as critical to achieving effective teaching and learning. The pre-ASEI condition was characterised by knowledge-based teaching, teacher centred teaching, lecture method/theoretical approach characterised by traditional chalk and talk and large scale ‘recipe‘ type of experiments. The shift from pre-ASEI to the ASEI condition advocates for the following:

Activity

This implies active, meaningful and constructive participation of the learner in learning situations by way of activities. Learners tend to learn more when they are active participants rather than passive recipient’s information (Freedman 1997,Hofstein 2003).

Learner

A pedagogical shift is advocated so that the main focus of lesson is on the student (learner) rather than the teacher. The lesson objectives should be geared to improving the learner academic achievement and his/her quality of learning.

Experiment

Experiment refers to activity in which the learners manipulate a variable and observes the effect on some other variables. Use of experiments enhances understanding scientific/mathematical concepts and principles.

Improvisation

Utilization of available materials in the learners immediate environment to raise interest and curiosity, modification and simplification of recipe type

textbooks experiments, scaling down for use in activities and experiments and use of non-conventional/equipment in lesson delivery.

Effective practice of ASEI calls for Proper Planning, Doing (carrying out the planned activity), seeing (evaluating the outcome of activity), followed by improvement; hence the acronym PDSI. Studies done by Mwelese and Atwoto (2014) revealed that the ASEI-PDSI had a significant effect on students' achievement. It was found that students through the ASEI-PDSI approach had a better view and attitude towards mathematics than those taught through traditional approaches. However, in their study titled 'The Impact of In-Service Education and Training (INSET) Programmes in Mathematics and Science on Classroom Interaction: A Case of Primary and Secondary Schools in Kenya, Sifuna and Kaime (2007) found out that while teachers perceived the SMASSE INSET programme as having been effective in exposing them to a student-centered approach, this was not reflected in their classroom practices which were largely teacher-dominated. This was partly attributed to large classes, the use of English as second language, and pressure to cover the syllabuses in preparation of the national examinations.

In addition, studies done by Kamau, Wilson and Thinguri (2014) titled "An evaluation of the effectiveness of SMASSE program in Performance of science and mathematics in primary schools in Kenya" shows that majority of teachers had not adopted the ASEI-PDSI approaches leading to poor results in mathematics.

2.3 Teachers attitude and implementation of ASEI-PDSI teaching approach.

A study done by Fair bank (2010) on why some teachers are more adaptive than others to change revealed that knowledge alone does not lead to the kind of thoughtful teaching every one strives to maintain. It revealed that teachers with similar professional knowledge and qualification were found to have differences in their teaching practices depending on how they perceived teaching. They suggested the need to go beyond knowledge in teacher education with the aim of exploring question about preparing thoughtful teachers.

Research findings by Ballone and Czernik (2001) indicate that attitude towards a certain behaviour is a strong determinant of teachers' intention to engage in a specified behaviour. They found that personal beliefs concerning the consequences of using investigative methods to teach physical science strongly influence their attitude towards doing so. Keys and Bryan. (2001) suggests that teachers beliefs about the nature of science, students learning and the role of the teacher suggested that these beliefs do affect teachers' planning teaching and assessment. A teacher's belief about learning and knowledge strongly impact the classroom climate enabling students to explore articulate and analyze their beliefs on topics. Jones and Mooney (1981) admit that students have traditionally considered mathematics as being one of the most difficult areas of science some students from negative attitudes towards mathematics long before they enrol in secondary school. According to

Mwarigu (2014) negative attitudes are displayed through verbal expression such as “I hate Mathematics”, “Mathematics is difficult” or can also be expressed through acted tendencies like sleeping during the lesson, yawning in class and looking bored, absentmindedness during the lesson, refusing to participate in the practical activity and obtaining poor results that do not bother the student.

According to Sogomo (2001) Teachers’ positive attitudes have been shown to attract more interest in their class and that student’s attitudes are a reflection of teacher’s attitudes. Positive attitude towards an innovation plays a significant role for it affects teaching and greatly improves the achievement of teaching and learning objectives

2.4 Head teachers’ supervision and implementation of ASEI –PDSI approach

According to Glickman (1990) School supervision is a positive action aimed at the improvement of classroom instructions through continual growth of all the concerned-the child, supervisor, the administrator and the parent. He argues that instructional supervision can oversee the implementation of educational policies and ascertain whether the implementation is effective.

School head teachers as supervisors play an important role within the SMASE project, they ensure that the mathematics teachers attend the SMASE training, they sensitize and stress the importance of the INSET, provide the necessary

support that the teachers need to implement the strategies and new approaches used during the ASEI-PDSI lessons, they also monitor and evaluate the classroom activities of the teachers who have attended the SMASE training (Wafubwa, 2014).

A study conducted by Wambui (2006) found that school head teachers had a significant effect on teachers' teaching practices. However studies have shown that the ASEI-PDSI approach is not being supervised by both the QASOs and the head teachers which has eventually led to poor performance in national examinations many head teachers spend more time with finance management than with curriculum and instruction a factor attributed to lack of effective training in educational administration, thus lacking the expertise to carry out effective supervision and evaluation of the curriculum practice in the schools.

2.5 Challenges Encountered in Implementation of ASEI-PDSI teaching Approaches

Studies on implementation of innovative teaching approaches have attempted to identify challenges teachers encounter in the course of implementation. In their study titled "The Impact of In-Service Education and Training (INSET) Programmes in Mathematics and Science on Classroom Interaction: A Case of Primary and Secondary Schools in Kenya", Sifuna and Kaime (2007) identified large classes, the use of English as second language, and pressure to cover the syllabuses in preparation of the national examinations as the major constraints teachers faced during the implementation of the ideals of the

SMASSE INSET. Other constraints included lack of adequate teaching and learning resources, lack of cooperation from the school administration, heavy teaching load and student absenteeism (Macharia, 2008; Muthemi, 2008; and Oirere, 2008).

According to Calder head (1992) teachers are not reflective; they are satisfied with their practices and do not tend to question educational processes. Moreover, they often disregard data that is inconsistent with their beliefs and practice and tend to avoid new experiences. Instead, they prefer to stick to only those practices that match their existing system of beliefs.Research findings by Oirere (2008) and Benedict (2013) established that pressure to cover the syllabus and large classes were the main constraints in the implementation of ASEI-PDSI approach.

2.6 Summary of literature review

A study by Gachahi, Kimani and Ngaruia (2014) on relationship between SMASE trained teachers' factors and primary school pupils mathematics and science achievement in Muranga county, revealed that there is no statistical significant relationship between SMASE trained teachers' level of application of SMASE skills (Hand-on manipulative skills) and pupils achievement in mathematics. Similarly, studies done by Kamau, Wilson and Thinguri (2014) on the influence of teaching approaches in the performance of mathematics and science in Kenya revealed that a majority of teachers had not adopted the ASEI-PDSI approaches leading to poor performance in the two subjects .It is

clear that the use of ASEI-PDSI approaches to teaching mathematics is not effective as studies reveal that teachers don't fully implement the objectives of the INSET in schools thus poor performance which leaves a knowledge gap to be studied.

2.7 Theoretical framework

The study was grounded in Piaget"s constructivism theory 1969. Constructivism is a theory based on observation and scientific study about how people learn. It says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. According to this theory learning is an active process in which learners construct new ideas or concepts based upon their current or past knowledge.

This theory advocates for transformation of information, constructing hypothesis and making meaning from information and experiences while relying on a cognitive structure to do so. Under constructivist theory learners bring experiences and understanding to the classroom they apply what they already know to match the new concepts they have gained.

The theory advocates for active participation of learners in the learning process, is an interactive process rather than passive. It encourages the learners to be involved in both psychomotor and the cognitive. The researcher will adopt the constructivist theory because the ASEI-PDSI paradigm advocates

for a learner centered approach where learners are active participants in the learning process and the teacher adopts a learner –centered method in teaching and learning of mathematics. The theory enables learners to enjoy learning more when they are actively involved rather than being passive listeners, it discourages rote memorization of facts, stimulates, engages students and promotes social and communication skills.

2.8 Conceptual framework

Orodho (2004) defines conceptual framework as a model of representation where a research conceptualizes or represents relationship between variables in the study and shows the relationships graphically or diagrammatically

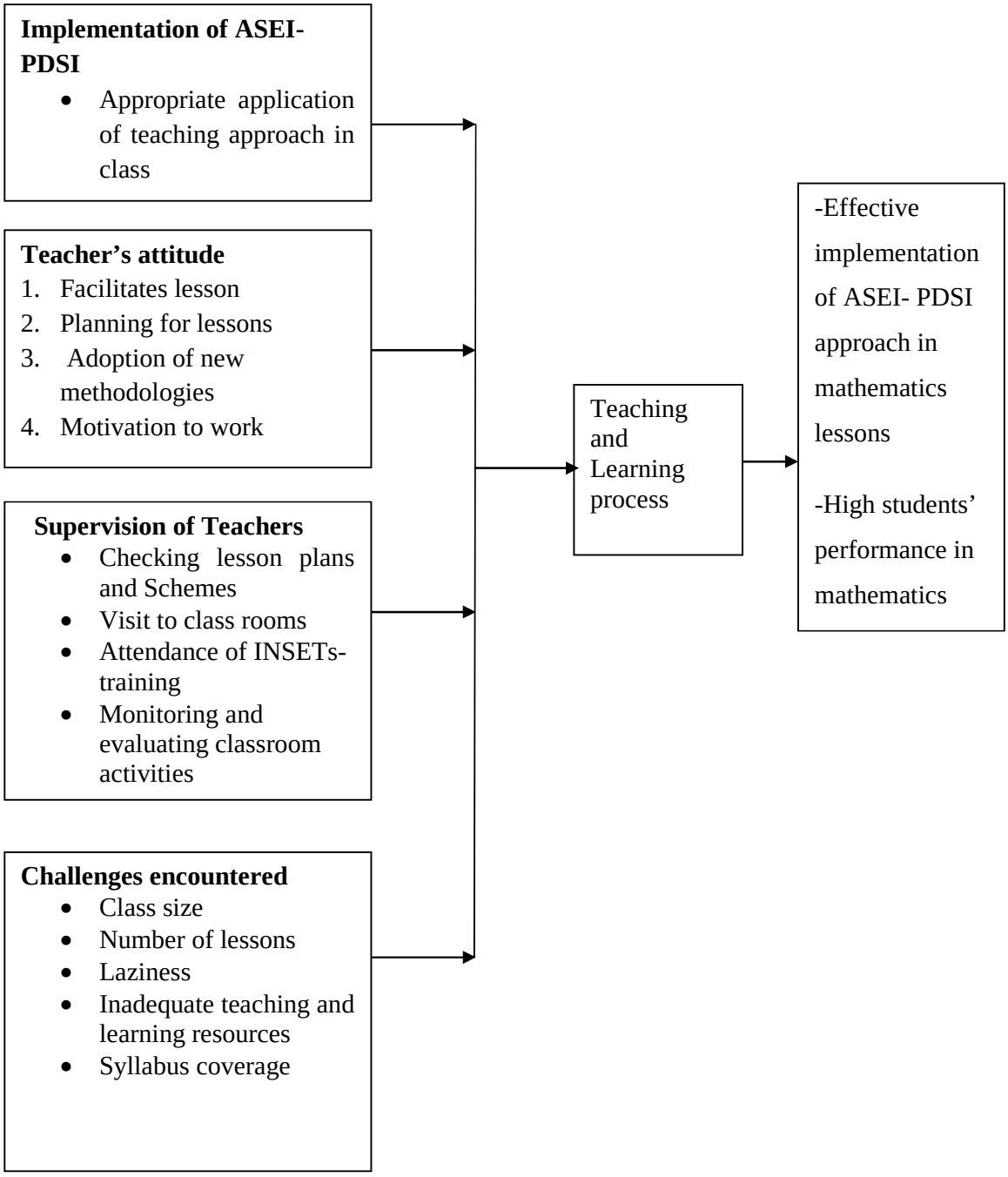

Figure 2.1: Conceptual framework on factors influencing implementation of ASEI-PDSI teaching approach.

Figure 2.1 shows that the SMASE training advocates for the use of ASEI-PDSI approach which is intended to equip mathematics teachers with knowledge and skills for effective class work practices to counter poor performance in mathematics, for the approach to be effective teachers need to understand fully the usage of ASEI-PDSI approach and supervision of implementation of the approach by the head teachers in schools is highly recommend.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the descriptional methods applied in carrying out the study. These include the research design, target population, sampling and sampling techniques, research instruments for data collection, validity and reliability of Instruments, data collection procedure, and data analysis techniques.

3.2 Research design

This study adopted descriptive Survey design. Descriptive study is one in which information is collected without changing the environment. Descriptive studies are the best methods for collecting information that demonstrate relationships and describe the world as it exists. Descriptive research design determines and report's findings the way they are. It attempts to describe possible factors such as behaviour, attitudes, values and characteristics Mugenda & Mugenda (2013).

It gathers data from relatively large number of cases at a particular time and this type of design has been widely used by educational researchers. It enables one to gather Information on opinions, attitudes and beliefs of the sampled population. It also enables one to employ research instruments such as questionnaires, interview schedule and document analysis for effective data collection and analysis. The design was appropriate for the study since the

head teachers and teachers have already undergone the SMASE-INSET and there was no manipulation of the training conditions, objectives or activities.

3.3 Target Population

The target population for this study was 95 public primary schools in Kisumu West Sub County, 200 mathematics teachers who have attended SMASE INSET programme. A population of 3103 class 7 pupils since they could participate in the focused group discussion.

3.4 Sample size and sample procedures

Orodho (2003), states that sampling is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the larger group thus representing the characteristics found in the entire group. According to Mugenda and Mugenda (2003) a sample size of 10-30% of the respondents can represent the target population. A sample of 29 schools was used for the study that is 30% of the 95 schools. Twenty nine (29) head teachers of the sampled schools were automatically selected, 60 teachers that is 30% of the 200 mathematics teachers and 310 pupils which is 10% of the total number of class 7 pupils. Stratified random sampling was used to select teachers and pupils from the selected primary schools. Simple random sampling is important in reducing the influence of extraneous variables in a study (Mugenda & Mugenda, 2003). The researcher used stratified sampling to take care of gender differences.

3.5 Research instruments

Data for the study was collected using questionnaires for head teachers and mathematics teachers. A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information. Kombo and Trump (2006) suggest that questionnaire is the most suitable research instrument for descriptive research design. Both open ended and closed ended questions were used. Questionnaires allowed the respondents to express themselves freely by giving their own opinions and because they had the ability to collect a large amount of information quickly (Orodho, 2004). The ASEI-PDSI checklist was used to evaluate the extent of the use of ASEI-PDSI approach in the classroom. The items in the questionnaires were designed based on the objects of the study. Section one sought information to figure out the responded background information while section two consists of items that were used to address the objective of the study. Focused group discussions with pupils in groups of 10 were also conducted.

3.6 Instrument validity

Validity is the extent to which research results can be accurately interpreted and generalized to other populations. It is the extent to which research instruments measure what they are intended to measure Oso and Onen (2005). The researcher tested content validity. Content validity is the extent to which a measuring instrument provides adequate coverage of the topic under study (Kothari, 2003).

The researcher sought the opinions from the supervisors and other experts to check for validity of the instruments. The instrument was then be piloted in 2 primary schools that were not to be involved in the study. The respondents included 6 mathematics teachers, 2 head teacher and 30 pupils, the results were used to modify the question that turned to be ambiguous.

3.7 Instruments reliability

Reliability of an instrument is the consistencies in producing reliable results. It focuses on the degree to which empirical indicators are considered across two or more attempts to measure theoretical concept (Orodho, 2005). It is a measure of degree to which research instrument will yield consistent result or data after repeated trials (Mugenda and Mugenda, 2003). The researcher used test retest method during piloting to determine the reliability of the instruments. The researcher administered the questionnaire twice at different intervals or occasions. The responses given in the second administration of the questionnaire were correlated with responses of the first administration. The reliability was then calculated using Pearson product moment correlation coefficient.

$$r = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]\}}}$$

Where r = Pearson co-relation co-efficient

X = result from first test

Y = result from second test

N = number of observations

Correlation coefficient of between 0.7 to 1 is considered reliable according to (Mugenda & Mugenda, 2003). The r value computed was 0.76; hence the research instruments were reliable.

3.8 Data collection procedures

The researcher obtained an introductory letter from the University of Nairobi. A research permit was then obtained from the National Commission for Science Technology and Innovation. The researcher then presented copies for the research permit to the County Commissioner, County Director of Education and the District Education Office in order to obtain the necessary authority to proceed with the study. The researcher then obtained an appointment with the sample school through the head teacher to visit and administer the questionnaire to establish rapport, explain the purpose of the study in order to create clarity to the respondents.

3.9 Data analysis techniques

To analyze the data obtained from the research study, questionnaires were cross-checked to ascertain their accuracy, completeness and uniformity of information. Quantitative data obtained from closed – ended questions were analyzed using descriptive statistics using percentages and frequencies. Tables were also be used to present the data. Qualitative data generated from open – ended questions was organized with themes and patterns categorized through content analysis based on variable from the objections. . Correlation analysis was also carried out to determine relationship between given variables.

3.10 Ethical considerations

The researcher identified himself to the respondents and explained the objectives of the study to the head teachers, and the mathematics teachers, he briefed the respondents on the purpose of the study and why he was carrying it out. Names of the respondents were not used in the study for purposes of confidentiality. The researcher applied for permission from the head teachers and the head of department of the schools to collect sample of lesson plans before conducting the research.

CHAPTER FOUR

DATA ANALYSIS INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter presents the findings, their interpretations and discussions. The findings of the study are presented on the basis of the research objectives, which were to; establish whether the use of ASEI-PDSI approach had influence on teaching and learning of mathematics in public primary schools in Kisumu West Sub-county, establish whether there was a significant relationship between teachers' attitudes and the level of implementation of ASEI-PDSI classroom approach, establish whether there was significant relationship between head teachers' supervision of ASEI-PDSI approach and performance of mathematics in public primary schools in Kisumu West Sub-County and to examine the challenges encountered by teachers in the implementation of the ASEI-PDSI approach.

The data were analyzed using both descriptive and inferential statistics. The descriptive statistics was used to describe and summarize the data inform of frequency distribution tables. The inferential statistics was used to make inferences and draw conclusions. The statistical package for social sciences (SSPS) version 20.0 analyzed the data.

4.2 Questionnaire Return Rate

The questionnaires that were fully answered were all included in the study. This response return rate of (92 %) was achieved, during the study call backs were made and the instruments were administered to each respondent to ensure that each and every selected respondent took part in the study.

Table 4.1: Response Rate Analysis

Response	**Respondents**	**Percentage**
Head teachers	24	82.76
Teachers	58	96.67
Total	**82**	**92.14**

This percentage was adequate to continue the study since according to Necamaya (1996) response return rate of more than 75% is enough for a study to continue.

4.3 Analysis of Demographic Data

This section presents the distribution of respondents by their gender, academic and professional qualification and their experience in teaching and learning mathematics.

4.3.1Gender of Respondents

The respondents were asked to indicate their gender. Their results are shown in Figure 4.1

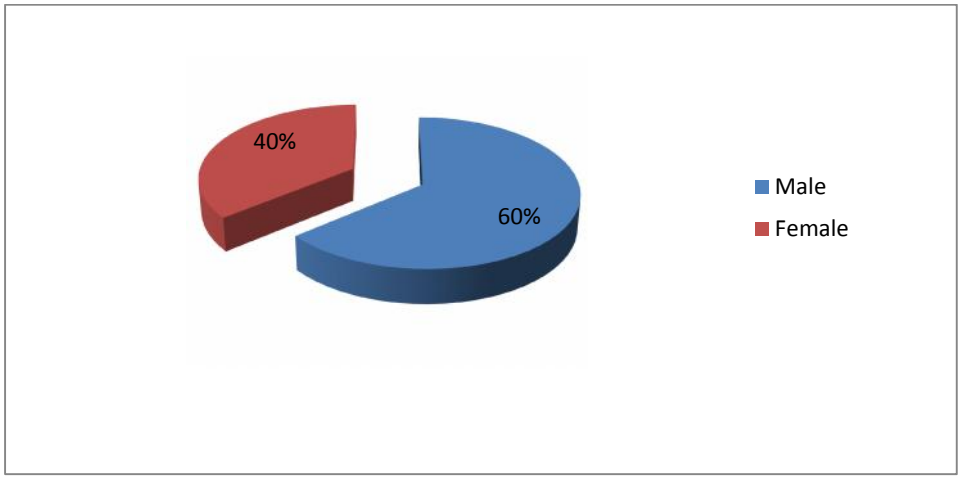

Figure 4.1: Gender of Respondents

Figure 4.1 indicates that majority of the respondents were male (60 percent) with female respondents making only (40 percent).Therefore, the gender respondents in this study was unevenly distributed. There was approximately 3:2 gender split for males to females. This indicated that more male teachers taught mathematics in primary schools than women.

4.3.2 Respondents' level of education

The study sought to establish the respondents' level of education. This variable was deemed worth establishing because the education level of the individual determined his or her ability to possess adequate information and interaction with the data collecting tools. Their responses are shown in Table 4.2.

Table 4.2: The distribution of respondents by their level of education

Level of Education	Head teachers	Percentage	Teachers	Percentage
Masters	6	25	3	5.17
Degree	15	62.5	12	20.69
Diploma	3	12.5	15	25.86
ATS 1			6	1.35
P1-certificate			22	37.93
Total	**24**	**100**	**58**	**100**

The findings in Table 4.2 shows Majority of head teachers (62.5 percent) had first degree and many teachers (37.93) had P1 certificate which is a requirement to qualify to teach primary level. Many head teachers and teachers had higher qualifications. This could be as a result that the current policy on promotion of teachers by Teachers Service Commission (TSC) is pegged on not only merit but academic qualification. Although teacher credentials such as teacher qualification and certificate have been proven by research to influence students' performance, this effect is weak (Kuenzi 2012). However, teacher credentials remain important consideration for a teacher to be recruited to teach in public schools.

4.3.3 Teachers' teaching experience

The teachers were asked about their experience in teaching and learning mathematics. The results are presented in Table. 4.3.

Table 4.3: Distribution of the respondents experience in teaching & learning mathematics

Years of experience	Respondents	Percentage
1-5 years	12	20.69
6-10 years	16	27.59
11-15 years	28	48.28
Over 15 years	2	3.44
Total	**58**	**100**

Table 4.3 indicates that many teachers (48.28 percent) had experience in teaching mathematics ranging between11-15 years. This shows that the teachers have experience and can adapt to changes brought about by use of ASEI – PDSI approach in teaching and learning mathematics.

4.4. Influence of ASEI-PDSI approach on teaching and learning of mathematics in public primary schools

In the first study objective, the study sought to find out to what extent ASEI-PDSI approach had influence on teaching and learning of mathematics in public primary schools. The researcher endeavored to explore the Teachers' Level of Understanding of ASEI-PDSI Components and Indicators. These responses were rated on a scale of 1 for little, 2 for medium, 3 for high, and 4 for very high. Respondents (n=58) gave their responses and is presented on Table 4.4.

Table 4.4: Teachers' Level of Understanding of ASEI-PDSI

Indicator	4	3	2	1
Lesson is activity-focused as practical work is given	34	10	8	6
Teacher gives learners appropriate tasks	38	12	7	1
Teacher effectively encourages pupils	30	16	10	2
Pupils ability to solve related problems	28	20	7	3
Pupils ability to use improvised materials effectively	19	16	14	9

N = 58

The findings in Table 4.4 revealed that majority of the teachers had very high level of understanding of ASEI-PDSI component. This was evidenced by the teachers ability to carry out the recommended concepts advocated by the ASEI-PDSI approach by planning the mathematics activities based on the ASEI-PDSI principles prior to the lesson, appropriately carrying out the planned activities with the pupils, evaluating the process afterwards and improving on the process based on the evaluation made. During the focus group discussion one of the respondents stated that "We are always given activities and task during our class-work that relates to what we are being taught".

ASEI-PDSI approach according to (Freedman 1997, Hofstein 2003) implies active, meaningful and constructive participation of the learner in learning situations by way of activities. Learners tend to learn more when they are active participants rather than passive recipient's information.

The study sought to establish lesson development on teaching and learning of mathematics, the results are presented on Table 4.5.

Table 4.5: Lesson development on teaching and learning of mathematics

Indicator	Frequency	Percentage
The teaching approach encourages learners to give their prior experiences, predictions and active participation of pupils in main leading steps.	30	51.72
Inco-operation of previous knowledge/skills was stimulation enough to arouse the interest and curiosity of learners.	28	48.28
Total	**58**	**100**

(N=58)

Table 4.5 indicates that majority of the respondents (51.72 percent) felt that lesson encouraged learners to give their prior experiences, predictions and active participation of pupils in main leading steps. The study findings indicate that lesson development support active participation of pupils in class during

mathematics. At some stage in the focused group discussion one of the respondents stated that “We are always prepared for the next lesson in that we are informed of what topics to read ahead”.

In ASEI-PDSI approach, pedagogical shift is advocated so that the main focus of lesson is on the pupils (learner) rather than the teacher. The lesson objectives should be geared to improving the learner academic achievement and his/her quality of learning. The study sought to establish the use of instructional materials on teaching and learning of mathematics, the results are presented on Table 4.6.

Table 4.6: Use of instructional materials on teaching and learning of mathematics

Indicator	**Frequency**	**Percentage**
Learners are encouraged to draw conclusions, summarize the lesson and gives follow-up activities.	10	17.24
Teacher makes effective use of the teaching learning materials and media.	16	27.59
Teachers invite questions and supervise class work.	24	41.38
Teachers make appropriate adjustments in the conduct of the lesson	8	13.79
Total	**58**	**100**

The findings in Table 4.6 indicates that many of respondents 41.38 percent (n=24) perceived that Instructional materials on teaching and learning of mathematics were necessary in that teachers invite questions and supervise class work. One respondent pointed out during the focus group discussion that "In class we ask our teacher questions where we do not understand and our work is marked by the teacher on a daily basis".

The ASEI lesson design considers the quality of classroom activities as critical to achieving effective teaching and learning. The pre-ASEI condition was characterized by knowledge-based teaching, teacher centered teaching, lecture method/theoretical approach characterized by traditional chalk and talks and large scale 'recipe' type of experiments.

The study sought to investigate the accessibility of teaching and learning resources, the results are presented on Table 4.7.

Table 4.7: Accessibility of teaching and learning resources

	Frequency	**Percentage**
Adequate	39	67.23
Inadequate	11	18.97
hardly enough	4	6.9
not sure	4	6.9
Total	**58**	**100**

Table 4.7 indicates that majority of respondents 67.23 percent (n=39) felt that the teaching and learning resources were adequately accessible. At some point in the focused group discussion one of the respondents stated that “we have mathematics text and exercise books that we use during lessons”. The poor performance in mathematics is a major concern to the governments, parents and educators, thus calling for remedial action. Among the possible reasons for the situation is the teaching approach that is mainly teacher centered, examination oriented and poor learning materials that may be resulting from ineffective instruction strategy (Jeremy 2003). Odhiambo and Ogwel (2008) observes that provision of instructional resources was the answer to poor performance in mathematics has failed to explain why some schools considered well-endowed in this regard have maintained low achievement in national examinations.

The study sought to explore whether the respondents developed teaching and learning materials after SMASE training, the results are presented on table (4.8)

Table 4.8: Teachers rate of developing teaching and learning materials after SMASE training

Indicators	Frequency	Percentage
Always	31	53.45
Total	**58**	**100**

The findings on Table 4.8 depicts that many of the respondents 53.45 percent (n=31) 48% (n=39) always develop teaching and learning materials after SMASE training, this was an indication that the respondents were refocusing their classroom practices and hence enhancing pupil's achievement.

Reys, Suydam and Lindquist (1995) provide a summary of reasons for a well-planned lesson: at the heart of every well planned lesson is the learner; well-planned lessons establish definite objectives for each lesson and help the teacher to ensure that essential content is included. Plans help ensure that lessons begin interestingly, maintain a good pace throughout and have a satisfying ending. They help the teacher to hold the interest and attention of the learner and to avoid unnecessary repetition hence creating confidence.

4.4.1 Correlation coefficient of ASEI-PDSI approach and teaching & learning of mathematics

The study used correlation analysis to establish any relationship between ASEI-PDSI approach and teaching & learning of mathematics, this was

accomplished through Pearson correlation coefficients. The findings were as shown in Table 4.9.

Table 4.9: Correlation between ASEI-PDSI approach and teaching & learning of mathematics

ASEI-PDSI factor	Statistic	Teaching & Learning Mathematics
ASEI-PDSI approach	Pearson Correlation	.642**
	Sig. (2-tailed)	.000
	N	58

**correlation is significant at the 0.001 level (2 tailed)

The study findings show a statistically significance positive correlation *(r= 642, P<0.001)* between ASEI-PSDI approach and teaching and learning of mathematics. This implies that if ASEI-PDSI approach can be implemented, pupils can benefit from the teaching & learning of mathematics.

4.5 The relationship between teachers' attitudes and the level of implementation of ASEI-PDSI classroom approach

The second objective of the study was to find out the relationship between teachers' attitudes and the level of implementation of ASEI-PDSI classroom approach. To achieve this, a descriptive analysis to determine frequency numbers of teacher attitudes and implementation of ASEI-PDSI approach had to be established. All the respondents (n=58) gave their opinion on whether

interactions with other participants during, INSET added value to them as teachers. The responses are provided in the Table 4.10

Table 4.10: Importance of interaction with other participants during INSET

Indicators	Frequency	Percentage
Strongly Agree	**28**	**48.28**
Agree	**18**	**31.03**
Not Sure	**7**	**12.07**
Disagree	**4**	**6.9**
Strongly Disagree	**1**	**1.72**
Total	**58**	**100**

Table 4.10 indicates that many of the respondents 48.28 percent (n=28) strongly agreed that interaction with other participants during, INSET added value to them. The study findings indicate that the interactions were quite beneficial to the respondent an indication that such interactions enhanced the respondent's experience on ASEI-PDSI classroom approach. According to Yara (2009) the teacher's attitude towards teaching mathematics plays a significant role in shaping attitudes of pupils towards learning mathematics. In this regard therefore, pupils' positive attitudes towards mathematics are enhanced by the teacher's enthusiasm, resourcefulness and helpful behavior, thorough knowledge of subject content, and their ability to make mathematics learning interesting.

Selinger (1994) provides a number of ways through which teachers can keep pupils' interest in learning mathematics high, hence, help them to build a positive attitude towards mathematics: mathematics teachers must be interested in finding ideas that can be used with groups of pupils who have a wide range of interests, in different ways of motivating pupils in a way that will promote a variety of responses to problems given to them. Effective mathematics learning is determined by among other things the ability of pupils to make connections, to retain skills and to have positive attitudes. Attitudes also in some settings predispose teachers towards the use of traditional teaching strategies as revealed by an analysis of teaching practices in seven European countries (Handal, 2003 & Hattie, 2003).

The study sought to investigate whether the INSET topics were relevant to the respondents the results are presented on Table 4.11.

Table 4.11: Relevance of INSET topics to teaching

Indicators	**Frequency**	**Percentage**
Strongly Agree	2	3.45
Agree	4	6.90
Relevance of INSET topic	9	15.52
Disagree	27	46.55
Strongly Disagree	16	27.57
Total	**58**	**100**

Table 4.11 Reveals many of the respondents 46.55 percent (n=27) disagreed with the relevance of INSET topics to their teaching and that the INSET topics were not being followed by the respondents this was an indication that many teachers had not adopted the ASEI-PDSI approaches leading to poor results in mathematics. Sifuna and Kaime (2007) found out that while teachers perceived the SMASSE INSET programme as having been effective in exposing them to a pupils-centered approach, this was not reflected in their classroom practices which were largely teacher-dominated. This was partly attributed to large classes, the use of English as second language, and pressure to cover the syllabuses in preparation of the national examinations. The study sought to establish whether SMASE INSET had no influence on teaching of mathematics, the results reflect on Table 4.12.

Table 4.12: Influence of SMASE INSET on teaching of mathematics

Indicators	**Frequency**	**Percentage**
Strongly Agree	31	53.45
Agree	14	24.14
Not Sure	6	10.35
Disagree	4	6.9
Strongly Disagree	3	5.17
Total	**58**	**100**

Table 4.12 indicates that majority of respondents 53.45 percent (n=31) strongly agreed that SMASE INSET had no influence on teaching of

mathematics, This reveals that the effect of SMASE INSET on teaching of mathematics was yet to be realized by the respondents this was an indication that the use of ASEI-PDSI approaches to teaching mathematics was not effective. The overall goal and purpose of SMASSE project was to facilitate improved pupils' ability in mathematics and sciences and to enhance the quality of mathematics and science education at secondary level through the INSET for teachers. Its objectives were to influence a change of attitude among teachers and pupils in order to enhance the quality of teaching and learning skills, as well as knowledge and achievement in national examinations (MOEST, 1998). The study sought to ascertain whether ASEI-PDSI approach helps the teacher focus more on learning objectives, the results are presented on Table 4.13

Table 4.13: ASEI-PDSI approach on the teacher focus on learning objectives

Indicators	**Frequency**	**Percentage**
Strongly Agree	32	55.17
Agree	16	27.59
Not Sure	5	8.62
Disagree	3	5.17
Strongly Disagree	2	3.45
Total	**58**	**100**

Table 4.13 shows that majority of the respondents 55.17 percent(n=32) strongly agreed that ASEI-PDSI approach helps the teacher focus more on learning objectives, study findings indicated that ASEI-PDSI approach helped the respondents address their learning objectives better. Karega (2008) observes that the INSET is one of the approaches used to improve teachers' skills and competence, and is in conformity with worldwide consensus that improving the quality of education depends on improved quality of classroom practices. Teachers with similar professional knowledge and qualification have differences in their teaching practices depending on how they perceive teaching.

The study sought to investigate if activities helped pupils understand difficult concepts, the results are presented on Table 4.14

Table 4.14: Understanding of difficult concepts

Indicators	**Frequency**	**Percentage**
Strongly Agree	27	46.55
Agree	21	36.21
Not Sure	7	12.7
Disagree	2	3.45
Strongly Disagree	1	1.72
Total	**58**	**100**

Table 4.14 indicates that many of the respondents 46.55 percent (n=27) strongly agreed that activities help pupils understand difficult concepts in

mathematics. JICA (2000) opines that mathematics teaching should be by far learner-centered while the teacher's role should be that of a facilitator, motivator, counselor and innovator. There must be many activities during any given one lesson: pupils centred activities involving a lot of improvisation will help demystify mathematics. Similarly Johnston-Wilder, Pimm and Westwell (1999) note that the mathematics teacher's task requires that: they use teaching methods which sustain the momentum of the learners' work and keep them engaged by stimulating intellectual curiosity, communicating enthusiasm; they match approaches used to the content to be taught and to the nature of learners to be taught; they effectively question, select and make good use of resource materials; and they exploit opportunities that contribute to the quality of pupils' wider educational development. If teachers are able to perform these tasks, the result of such effort will be a motivated pupils and positive achievement will also be realized.

The study sought to establish whether activities delayed syllabus coverage, the results are presented table (4.15).

Table 4.15: Activities and syllabus coverage

Indicators	Frequency	Percentage
Strongly Agree	25	43.1
Agree	17	29.31
Not Sure	9	15.52
Disagree	5	8.62
Strongly Disagree	2	3.45
Total	**58**	**100**

The findings in Table 4.15 shows that many of the respondents 43.1 percent (n=25) strongly agreed that activities delayed syllabus coverage in schools. According to Wambui (2006), the nationwide SMASSE project impact assessment survey conducted in 2004 established that teachers who had been exposed to the ASEI-PDSI approach planned better and more consistently, attended to pupils needs better, were more open to teamwork, were more confident, tried out new methods of teaching, and faced the challenge of large classes and lack of resources better.

The study sought to establish whether ten days duration of INSET was adequate, the results are presented on Table 4.16

Table 4.16: Adequacy of ten day's duration of INSET

Indicators	Frequency	Percentage
Strongly Agree	5	8.62
Agree	7	12.07
Not Sure	11	18.97
Disagree	19	32.56
Strongly Disagree	16	27.59
Total	**58**	**100**

Table 4.16 indicates that many of the respondents 32.56 percent (n=19) disagreed that ten days duration of INSET was not adequate for respondents to grasp much. Ministry of Education, Science and Technology (MoEST) has a framework for INSET. This is based on the recommendations of the Master Plan on Education and Training(MPET), Kenya, 1997-2000 which states that among other things, teaching and learning transactions will be made more learner-centered through development of focused in-service courses for teachers. It is for this reason that MoEST has made the SMASSE INSET one of the investment programmes in the Kenya Education Sector Support Programme (KESSP 2005-2010).

4.5.1 Correlation between teachers' attitudes and the level of ASEI-PDSI implementation

A two tailed Bivariate Pearson correlation analysis was conducted to establish a relationship exists between teachers' attitudes and the level of implementation of ASEI-PDSI classroom approach and the results are shown in the table 4.17.

Table 4.17: Correlation between teachers' attitudes and the level of implementation of ASEI-PDSI classroom approach

ASEI-PDSI factor	Statistic	Implementation of ASEI-PDSI
Teachers attitude	Pearson Correlation	0.542**
	Sig. (2-tailed)	0.05
	N	58

**Correlation is significant at the 0.05 level (2 tailed)

Source: Researcher's Analysis

The results in Table 4.17 indicate a strong positive correlation between teacher attitude and level of ASEI-PDSI implementation at a significance level of *(r=0.542, P<0.05).* Teachers' attitudes should be positive in order to support the implementation of ASEI-PDSI classroom approach. Research findings by Ballone and Czernik (2001) indicate that attitude towards a certain behaviour is a strong determinant of teachers intention to engage in a specified behaviour. They found that personal beliefs concerning the consequences of using investigative methods to teach physical science strongly influence their attitude towards doing so. According to Sogomo (2001) Teachers positive attitudes have been shown to attract more interest in their class and that pupils' attitudes are a reflection of teacher's attitudes. Positive attitude towards an innovation plays a significant role for it affects teaching and greatly improves the achievement of teaching and learning objectives.

4.6 The relationship between head teachers' supervision of ASEI-PDSI approach and performance of mathematics in public primary schools

The third objective of the study was to find out the relationship between head teachers' supervision of ASEI-PDSI approach and performance of mathematics in public primary schools. The study sought to establish the level of supervision as presented on Table 4.18.

Table 4.18: Level of Supervision of ASEI-PDSI approach and performance of mathematics

Supervision Aspect	Frequency	Percentage
Conducting classroom evaluations of mathematics lessons	20	83.33
Holding of individual conferences with mathematics teachers	16	66.67
Provision of mathematics teaching and learning resources	19	79.17
Ensuring adequacy of the teaching and learning resources	19	79.17
Acquisition of teaching and learning in materials in advance	14	58.33
Checking schemes of work	20	83.33
Checking of ASEI lesson plans	17	70.83
Checking of pupils' progress records by head teachers	12	50

N = 24

Table 4.18 majority of the head teachers 83.33 percent (n=20) stated that they conduct classroom evaluations of mathematics lessons. The study findings indicate that classroom evaluations of mathematics lessons were conducted frequently as a measure of ensuring that teacher's delivery and pupil's performance was enhanced.

School head teachers as supervisors play an play important role within the SMASE project, they ensure that the mathematics teachers attend the SMASE training, they sensitize and stress the importance of the INSET, provide the necessary support that the teachers need to implement the strategies and new approaches used during the ASEI-PDSI lessons, they also monitor and evaluate the classroom activities of the teachers who have attended the SMASE training (Wafubwa, 2014). According to SMASE Project (2000), the specific roles of head teachers in the SMASE programme include: utilizing scarce resources at their disposal more rationally towards academic activities for the benefit of the learners; mobilize all available resources, both human and physical, for enhancement of teaching and learning activities; conduct regular school-based supervision of teaching and learning activities; and organize regular seminars and workshops for mathematics and science teachers through science congress.

As set forth in objective three, a two tailed Bivariate Pearson correlation coefficient to establish whether a relationship exists between head teachers' supervision of ASEI-PDSI approach and performance of mathematics was undertaken. The results are shown in the table 4.19:

Table 4.19: Correlation between head teachers' supervision of ASEI-PDSI approach and performance of mathematics

ASEI-PDSI factor	Statistics	Performance of Mathematics
Supervision	Pearson Correlation	0.671**
	Sig. (2-tailed)	0.05
	N	24

**Correlation is significant at the 0.05 level (2 tailed)

The results indicate a strong positive correlation between supervision and performance of mathematics *(r=, 671, P<0.05)*. Head teachers' should supervise the implementation of ASEI-PDSI approach in order to enhance the performance of mathematics by pupils.

Study conducted by Wambui (2006) found that school head teachers had a significant effect on teachers teaching practices. According to Glickman (1990) School supervision is a positive action aimed at the improvement of classroom instructions through continual growth of all the concerned-the child, supervisor, the administrator and the parent. He urges that instructional supervision can oversee the implementation of educational policies and ascertain whether the implementation is effective. Carrying out classroom visits to observe lessons is another role of the head teacher. The Manual of Heads of Secondary Schools in Kenya (1987) stresses this role by noting that in particular, the head teacher must check the teaching standards by reference to the schemes of work, lesson notes, pupils exercise books, records of work

done; and by actual visits to the classroom to see the work of individual teachers.

4.7 Challenges encountered by teachers in the implementation of the ASEI-PDSI approach

The fourth study objective sought to examine the challenges encountered by teachers in the implementation of ASEI-PDSI approach in Kisumu West Sub. The responses encountered by teachers in the implementation of ASEI-PDSI approach are presented on Table 4.20.

Table 4.20: Challenges encountered by teachers in the implementation of ASEI-PDSI approach

Challenges	Frequency	Percentage
Lack of training	26	44.83
Principals authoritarianism	30	51.72
Large classes	37	63.79
Pressure to cover the syllabuses	35	60.35
Lack of adequate teaching and learning resources	33	56.9
Lack of cooperation from the school administration	28	48.28
Heavy teaching load	36	60.07
Pupil absenteeism	20	34.48

N = 58

Table 4.20 exemplify the challenges influencing teachers in the implementation of ASEI-PDSI approach, 63.79 percent (n=37) of the teachers stated that large classes hindered the implementation of ASEI-PDSI. This finding is consistent with findings by Oirere (2008) in which it was established that pressure to cover syllabus and large classes were the main constraints in the implementation of the ASEI-PDSI approach. Large classes hampered the implementation of TELL strategies and methods (USAID-AIR, 2010)

Sifuna and Kaime (2007) identified large classes, the use of English as second language, and pressure to cover the syllabuses in preparation of the national examinations as the major constraints teachers faced during the implementation of the ideals of the SMASSE INSET. Other constraints included lack of adequate teaching and learning resources, lack of cooperation from the school administration, heavy teaching load and pupils' absenteeism (Macharia, 2008; Muthemi, 2008; and Oirere, 2008). Research findings by Oirere (2008) and Benedict (2013) established that pressure to cover the syllabus and large classes were the main constraints in the implementation of ASEI-PDSI approach.

The rare supervision of the implementation of the ASEI-PDSI approach may be partly attributed to the challenges head teachers face while carrying out supervision. Head teachers were asked on the challenges they encountered and their responses are presented in Table 4.21.

Table 4.21: Challenges encountered by head teachers in the implementation of ASEI-PDSI approach

Challenges	frequency	percentage
Untimely release of Tuition Money from the Ministry of Education	20	91.67
Negative attitude by mathematics teachers	15	62.5
Discouragement from other teachers	16	66.67
Lack of adequate time for supervision of ASEI-PDSI approach	10	41.67
Suspicion from teachers during supervision	14	58.33
Lazy mathematics teacher	15	62.5

N = 24

Table 4.21 indicates that majority of head teachers (91.67 percent) felt that untimely release of tuition money from the ministry was their biggest challenge. Other challenges included discouragement of mathematics teaches by other teachers, laziness on the part of mathematics teachers and suspicion from teachers during supervision.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study findings in the following order; purpose of the study, objectives, study findings, conclusions, recommendation, and areas for further research.

5.2 Summary of the study

The purpose of the study was to evaluate the ASEI-PDSI teaching approach in public primary schools in Kisumu West Sub- County, Kenya. The study aimed to achieve the following objectives; to establish whether the use of ASEI-PDSI approach had influence on teaching and learning of mathematics in public primary schools in Kisumu West Sub-county, to establish whether there was a significant relationship between teachers' attitudes and the level of implementation of ASEI-PDSI classroom approach, to establish whether there was significant relationship between head teachers' supervision of ASEI-PDSI approach and performance of mathematics in public primary schools in Kisumu West Sub-County and to examine the challenges encountered by teachers in the implementation of the ASEI-PDSI approach. This study therefore concludes that schools that took part in this study had adequate professionally trained teachers, a majority of whom had attended the SMASSE INSET but were not implementing the same. Whereas physical facilities were adequate as well as teaching-learning resources in most schools, a few of them

were struggling with available limited materials. It emerged that the adequacy of teachers, facilities and material resources was not translated to a readiness to apply the principles of ASEI/PDSI by teachers as findings reveal that lessons were less-interactive and more teacher-dominated. The principles of ASEI/PDSI were generally invisible during instructional sessions. It was also realized that teachers were more negative in their views about the use of ASEI/PDSI principles as opposed to their pupils whose responses reflected a lot of interest and positive energy around many aspects of ASEI/PDSI. It is evident from the presented findings that successful application of ASEI/PDSI principles depends on the extent of school preparedness and more so teacher preparedness. When preparedness is insufficient, the outcome is the inability to put the principles into use for the sake so as to enhance pupils' achievement in examinations.

5.2.1 ASEI-PDSI approach had influence on teaching and learning of mathematics

The first research objective; influence of ASEI-PDSI approach on teaching and learning findings reveal that the teacher's level of understanding of ASEI-PDSI components and indicators was characterized by teacher's giving learners appropriate tasks thus considered to be an understanding of ASEI-PDSI approach. The study findings indicated further that lesson development supported active participation of pupils in class during mathematics and that teachers invited questions and supervised class work. The study findings disclosed that teaching and learning resources were accessible and that the

respondents always developed teaching and learning materials after SMASE training this was an indication that the respondents were refocusing their classroom practices and hence enhancing pupil's achievement. The study findings show a statistically significant positive correlation between ASEI-PSDI approach and teaching and learning of mathematics.

5.2.2 The relationship between teachers' attitudes and the level of implementation of ASEI-PDSI classroom approach

The findings on the second objective; the relationship between teachers' attitudes and the level of implementation of ASEI-PDSI class room approach indicate that the interactions between the respondents were quite beneficial and that such interactions enhanced the respondent's experience on ASEI-PDSI classroom approach. The study findings further revealed that the INSET topics were not being followed by the respondents and that the effect of SMASE INSET on teaching of mathematics was yet to be realized by the respondents. The study findings further indicated that ASEI-PDSI approach helped the respondents address their learning objectives better. The study findings indicated that activities helped pupils to comprehend intricate concepts but also delayed syllabus coverage in schools. The study findings further indicated that ten days duration of INSET was not adequate for respondents to grasp much. The results indicate a strong positive correlation between teacher attitude and level of ASEI-PDSI implementation.

5.2.3 The relationship between head teachers' supervision of ASEI-PDSI approach and performance of mathematics.

The study findings on the relationship between head teachers supervision of ASEI-PDSI approach and performance of the mathematics indicate that classroom evaluations of mathematics lessons were conducted frequently as a measure of ensuring those teachers' delivery and pupils' performance was enhanced. The results indicate a strong positive correlation between supervision and performance of mathematics.

5.2.4 The challenges encountered by teachers in the implementation of the ASEI-PDSI approach

The study findings on the fourth study objective; challenges encountered by teachers in the implementation of ASEI-PDSI approach revealed that majority of teachers (63.79 percent) stated that larger classes were a challenge that influenced teachers in the implementation of ASEI-PDSI approach. Other challenges included pressure to cover the syllabus (60.35 percent) and lack of teaching and learning resources (56.9 percent). Majority of head teachers (91.67 percent) stated that untimely release of tuition money, discouragement of mathematics teachers by other teachers (66.67 percent) and laziness on the part of mathematics teachers (62.5percent) as challenges encountered in the implementation of the ASEI-PDSI approach.

5.3 Conclusion

The study concluded from the findings that teachers had a high understanding of the ASEI-PDSI approach and this had a positive influence on teaching and learning of mathematics. It was also revealed that teachers had appositive attitude towards the implementation of the ASEI-PDSI approach. From the study it can also be concluded that the head teachers supervised the implementation of the ASEI-PDSI approach in mathematics lessons thus enhancing the effective implementation of the approach. Certain challenges facing the implementation of the approach was revealed in this study, such constraints include large classes, pressure to cover the syllabus, untimely release of tuition money and laziness on the part of the teachers.

5.4 Recommendations

Based on the findings of the study, the following recommendations were made;

i. The Ministry of Education and JICA should adequately fund/donate public primary schools with the teaching and learning materials and resources for teaching mathematics for the effective implementation of the ASEI-PDSI approach.

ii. Concerning teachers' attitudes towards the ASEI-PDSI approach, the government and school administrators should facilitate frequent mathematics workshops to enhance teachers' confidence and capabilities for effective implementation of the ASEI-PDSI approach when teaching mathematics.

iii. INSETS should be organized for primary school head teachers so that they can be more conversant with the supervision requirements of the ASEI-PDSI approach so as to give them more confidence as they oversee the implementation of the approach in their schools.

iv. The Ministry Of Education and JICA should set more funds to purchase adequate materials/tools required during teaching of mathematics to support the teachers implementing the ASEI/PDSI approach thus mitigating some challenges that arise during implementation.

5.5 Suggestion for further study

The study recommends further research to be carried out in the following areas;

i. This study recommends that further research should be conducted on the impact of class size on application of ASEI/PDSI approach for mathematics curriculum delivery in primary schools.

ii. A similar research like this one should be carried out with a larger sample or in another locale particularly in a rural setting.

iii. A similar research like this one should be carried out with a larger sample or in another locale particularly in a rural setting.

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APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

OKELLO BRIAN ODHIAMBO
UNIVERSITY OF NAIROBI
P.O.BOX 30197-00100,
NAIROBI
DATE

Dear Sir/Madam,

RE: PERMISSION TO COLLECT DATA

I am a postgraduate student in the University of Nairobi, pursuing a master's degree in curriculum studies. I am researching on the evaluation of activity student experiment improvisation-plan do see and improve (ASEI-PDSI) teaching approach Kisumu West Sub- County, Kisumu.

Your school has been selected to participate in the research. You are requested to respond to the questionnaire item as honestly as possible and to the best of your knowledge. This research is purely for academic purposes.

Kindly note that your name and that of your school will not be included in the research tools.

Thank you.

Yours faithfully,

OKELLO BRIAN ODHIAMBO

APPENDIX II: QUESTIONNAIRE FOR MATHEMATICS TEACHERS

You are kindly requested to fill the questionnaires indicating your honest response by putting a tick against your responses or filing blanks next to them as indicated. Please do not write your name or name of your school anywhere in this questionnaire.

Section A: Background information

1) Please indicate your gender
2) Please indicate you age bracket
3) What is your highest professional qualifications

Section B: Teachers' Level of Understanding of ASEI-PDSI Components and Indicators

Please rate your level of understanding of the ASEI-PDSI approach by ticking in the appropriate box for each indicator. Use the scale: **1** for **little**, **2** for **mediu**m, **3** for **high**, and **4** for **very high.**

Indicator	**4**	**3**	**2**	**1**
1) Lesson is activity-focused as practical work is given				
2) Teacher gives learners appropriate tasks				
3) Teacher effectively encourages students to give their prior experiences.				
4) Students ability to solve related problems				
5) Students ability to use improvised materials effectively.				
Introduction				
Inco-operation of previous knowledge/skills stimulation enough to arouse the interest and curiosity of learners.				
Lesson development				
Lesson encourages learners to give their prior experiences, hypothesis/predictions active participation of students in main leading steps.				
Conclusion				

Learners encourage learners to draw conclusions, summarize the lesson and gives follow-up activities.				
Use of instructional materials				
Teacher makes effective use of the teaching learning materials and media. -Teachers invite questions and supervise class work. -Teachers make appropriate adjustments in the conduct of the lesson				

Teaching learning resources

4. **(a)** How would you describe the availability of teaching learning resources?

Adequate [ ] inadequate [ ] hardly enough [ ] not sure [ ]

(b)Explain your answer……..

5. How often do you develop teaching learning materials with the knowledge acquired from SMASE training? Always [ ] sometimes [ ] rarely [ ] not at all [ ]

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6. What factors hinders effective use of teaching and learning resources in your school?.

ATTITUDE

Please consider the statement written and then tick (√) to indicate to what extent you agree or disagree

Key: SA – Strongly Agree (1) A-Agree (2) NS- Not Sure (3)

D – Disagree (4) SD Strongly Disagree (5)

7. (a) Interaction with other participants during, INSET adds value to me as a teacher SA [ ] A [ ] NS [ ] D [ ] SD [ ]

(b) The INSET topics are relevant to my teaching,

SA [ ] A [ ] NS [ ] D [ ] SD [ ]

(c) SMASE INSET has no influence on teaching of mathematics

SA [ ] A [ ] D [ ] SD [ ]

(d) The ASEI-PDSI approach help a teacher focus more on the learning objectives. SA [ ] A [ ] NS [ ] D [ ] SD [ ]

(e) Activities help students to understand difficult concepts,

SA [ ] A [ ] NS [ ] D [ ] SD [ ]

(f) Activities delay syllabus coverage,

SA [ ] A [ ] NS [ ] D [ ] SD [ ]

(g) Ten days duration of INSET is adequate,

SA [ ] A [ ] NS [ ] D [ ] SD [

SECTION C; Constraints and improvement of ASEI-PDSI Approach

1. What constraints do you encounter while implementing the ASEI-PDSI approach?
2. How can the implementation of the ASEI-PDSI approach be improved?

APPENDIX III: QUESTIONNAIRE FOR HEAD TEACHERS

This is a study that seeks to assess the implementation of the ASEI-PDSI approach in mathematics lessons in primary schools of Kisumu West Sub-County. You have been selected to participate in this study. I will appreciate it if you could take your time to respond to this survey questions. Your views will be kept strictly confidential and will only be used for the purpose of this study. Your honest response to this interview schedule will make this study a success. Thank you for taking your time.

Section A: Background Information

1. Gender: A. Male

B. Female

2. What is your academic qualification? A. Dip. Ed

B. B. Ed

C. B.A/B.Sc

D. B.A/B.Sc with PGDE

E. Masters

F. Any Other_____

3. What is your headship experience?

A: 4 years and below

B: 5-9 years

C: 10-14 years

D: 15-19 years

E: 20 years and above

Section B: Supervision of Implementation of the ASEI-PDSI Approach

Please rate your frequency of supervision of the ASEI-PDSI approach by ticking in the appropriate box for each aspect. Use the scale: **1** for **Never**, **2** for **Rarely**, **3** for **Often**, and **4** for **Very Often.**

Supervision Aspect	**4**	**3**	**2**	**1**
1.Conducting classroom evaluations of mathematics lessons				
2. Holding of individual conferences with mathematics teachers (s)				
3.Provision of mathematics teaching and learning resources				
4. Ensuring adequacy of the teaching and learning resources				
5.Acquisition of teaching and learning in materials in advance				
6.Checking schemes of work				
7. Checking of ASEI lesson plans				
8. Checking of students' progress records.				

1. What has been accomplished in the school as far as SMASE training is concerned.

2. How can you rate the attendance of SMASE by mathematics teachers in your School?

3. What can you say about the practice of ASEI- PDSI aspects in your school with regard to:

a) Lesson plan preparation

b) Involving students in learning activities

c) Utilization of locally available resources in carrying out an experiment

4. What role have you played in the implementation of the ASEI- PDSI approach in your school?

5. Are teachers in the school satisfied with ASEI lesson plan? If not why?

6. What challenges do you face in the implementation of ASEI –PDSI approach?

7. Do you think SMASSE has had any impact on mathematics as one of its target subjects? If yes how?

8. What role has SMASSE project played in the KCPE mathematics performance in your school?

9. What general observations can you give in relationship to SMASE ASEI-PDSI approach?

SECTION C: Constraints and improvements of ASEI- PDSI approach

1. What constraints do you encounter while supervising on the implementation of ASEI- PDSI approach?
2. How can the implementation of the ASEI- DPSI approach can e improved?

APPENDIX IV: FOCUSED GROUP DISCUSSION GUIDE FOR PUPILS

1. Do your teachers and Head teacher conduct classroom evaluations of mathematics lessons
2. Do your teachers and Head teacher hold of individual conferences with mathematics teachers(s)
3. Do your teachers and Head teacher provide mathematics teaching and learning resources
4. Do your teachers and Head teacher ensure adequacy of the teaching and learning resources
5. Do your teachers and Head teacher acquire teaching and learning in materials in advance
6. How many times does your teacher miss mathematics lesson?
7. Are your lessons prepared well by your teacher
8. Does your teacher Involve students in learning activities
9. Does your teacher utilize locally available resources in carrying out an experiment
10. What challenges do you face when leaning mathematics

APPENDIX V: RESEARCH CLEARANCE PERMIT

THIS IS TO CERTIFY THAT:
MR. OKELLO BRIAN ODHIAMBO
of UNIVERSITY OF NAIROBI, 406-600
NAIROBI,has been permitted to conduct
research in *Kisumu County*

on the topic: *AN EVALUATION OF ASEI-PDSI TEACHING APPROACH IN PUBLIC PRIMARY SCHOOLS IN KISUMU WEST SUB COUNTY, KENYA.*

for the period ending:
4th March,2017

Permit No : NACOSTI/P/16/54271/9008
Date Of Issue : 7th March,2016
Fee Recieved :Ksh 1000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

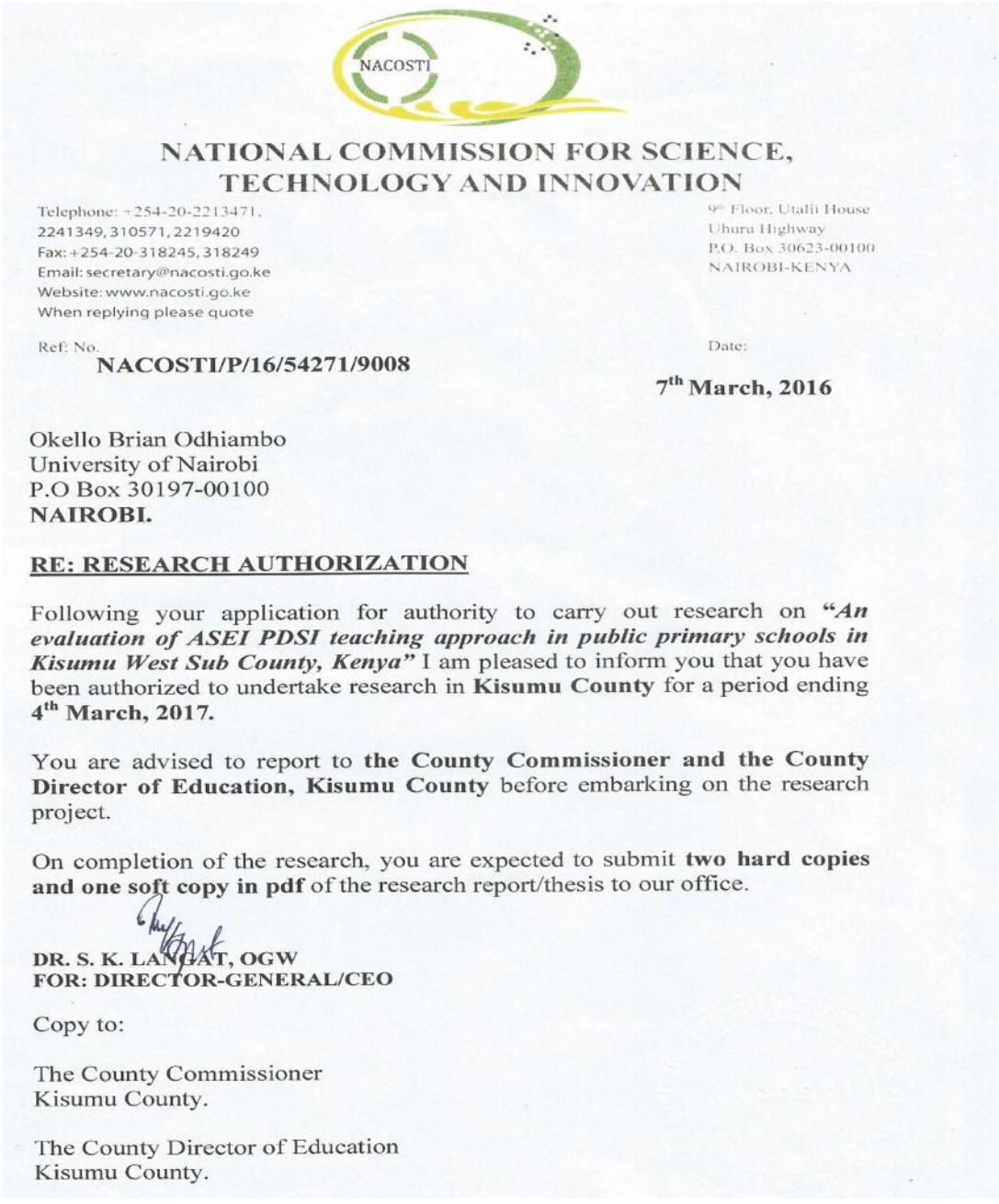
National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 8068

CONDITIONS: see back page

APPENDIX VI: RESEARCH AUTHORIZATION



NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/16/54271/9008**

Date: **7th March, 2016**

Okello Brian Odhiambo
University of Nairobi
P.O Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"An evaluation of ASEI PDSI teaching approach in public primary schools in Kisumu West Sub County, Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Kisumu County** for a period ending **4th March, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Kisumu County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. S. K. LANGAT, OGW
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kisumu County.

The County Director of Education
Kisumu County.