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**BARRIERS TO EFFECTIVE UTILIZATION OF RESOURCES IN
THE TEACHING/LEARNING OF SCIENCES IN SECONDARY
SCHOOLS IN THIKA, KIAMBU COUNTY**

BY

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**A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF
EDUCATION IN PARTIAL FULFILLMENT FOR THE
REQUIREMENT OF THE AWARD OF DEGREE OF MASTER IN
EDUCATION**

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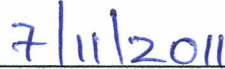
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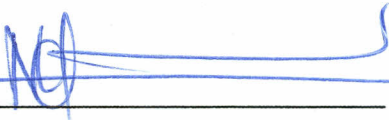
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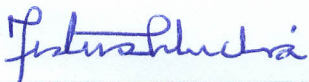
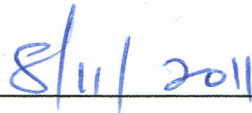
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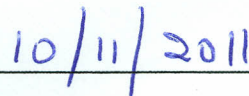
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DEDICATION

To my dear husband Mr. Wanderi and our children Gladys, Collins and Simon,
for their love, support, and encouragement throughout this study.

ACKNOWLEDGEMENTS

First and foremost I thank the almighty God who gave me the time, strength and inspiration to accomplish the project within the prescribed period of time.

I wish to appreciate all those who contributed either directly or indirectly towards making this project a success. These included Dr. Waweru S.N. and Dr. F. Muchira who offered scholarly guidance towards the project

ABSTRACT

The sciences form an important block of the secondary school curriculum. In fact at K.C.S.E., a candidate must choose at least two science subjects. This is due to the importance attached to the sciences in view of national development and the desire to have Kenya as an industrialized Nation by 2030. Numerous innovations and strategies have been made for the improvement of the quality of the secondary school science in Kenya. Example of the strategies is the provision of the teaching/learning resources by the schools, government and even donors. The Ministry of Education (MoE) in conjunction with the Japanese Government initiated the SMASSE project in 1998 as a project. The mandate of the project mainly focuses on in-servicing science teachers especially in the use of resources while teaching sciences. The Government under targeted programs also provides laboratory equipment in some schools including those in Thika West District. Despite all this, the sciences continue to be dismally performed in the KCSE exams due to the non effective utilization of these resources among other causes. To this end the purpose of this study is to examine barriers to effective utilization of resources in the teaching of sciences in selected secondary schools in Thika West District. The objectives of the study were to investigate the adequacy of available resources in the learning/teaching of sciences in the selected schools, determine teacher-related, student-related and school-related barriers that hinder effective utilization of resources. The study identified eight (8) schools using purposive sampling techniques basing itself on the school categories such as two national, three provincial and district schools. It considered boarding / day type of schools, boys/ girl or mixed. From the sampled schools, an equal number of students (10) were selected from form 3 classes and four (4) science teachers per school participated in the study. Piloting was carried out in two schools in the District not included in the study. The schools were randomly chosen. This allowed errors encountered during piloting to be corrected before the main study. The data was collected using questionnaires for students and teachers while resource checklist was used to investigate available resources especially in the laboratories. The data obtained was analyzed using descriptive statistics and was presented with aid of frequency tables, percentage, pie charts and graphs. The study established that students like Chemistry as a subject but they perform dismally; Physics being so unpopular and poorly performed conventionally is performed best in Thika West District. It was also established that majority of the Science teachers have not undergone SMASSE training. The study revealed that other areas that require to be addressed by the school or otherwise, those that hinder effective utilization of resources in schools were; Shortage of space and facilities, morale of teachers and students, number of teachers to be increased and enrolment of students to be monitored. The study recommends that: schools, parents and the community at large should join hands and ensure that schools have adequate resources for science subjects, especially laboratory equipment; the TSC should employ enough science teachers and ensure they are distributed to schools as per the number of students. This will ensure that teachers are not overworked, leading to better performance in sciences by students in the long run; further, school heads should motivate teachers by ensuring they are provided with the teaching/learning resources needed for science subjects; among other recommendations.

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LIST OF ACRONYM AND ABBREVIATIONS

ASEI	:	Activity, Student Experiment and Improve
J.I.C.A	:	Japan International Co-operation Agency
K.C.S.E	:	Kenya Certificate of Secondary Education
M.O.E	:	Ministry of education
P.I.M	:	Printed Instructional Media
PDSI	:	Plan, Do, See and Improve
SMASSE	:	Strengthening of Mathematics and Sciences in Secondary Schools
T.S.C	:	Teachers Service Commission

CHAPTER ONE

1.0 Introduction

In this chapter, the background to the study, statement of the problem purpose and objectives of the study, research questions, significance of the study, assumptions, limitations and delimitations, theoretical and conceptual framework and operational definition of central terms are presented.

1.1 Background to the Study

According to Oluoch (1982), schools are established to implement national education curriculum through effective teaching/learning. The quality of implementation is closely related to the nature and quality of resources available and how well they are used. The Republic of Kenya (1976) recommended that resources be made available to the learners in adequate qualities and quantities and at an affordable cost. Adequate resources in teaching help bring situations in the classroom context. According to Wright (1976) resources help to create situations that make learning interesting or else they inhibit learning. He also noted that resource serve to stimulate learners imagination and also enhances memory of what is learnt. It encourages learners to use more than one sense.

Orpwood (2001) noted that instructional materials when available and used well make learning easier especially when abstract concepts are being learnt. Dale (1969) recommends that teachers should learn how to use resources effectively. Orodho (1996) noted that resource availability and their utilization is very crucial in the achievement of good science results. Kathuri (1993) in his study noted that effective utilization of the teaching/learning resources in sciences together with other extrinsic and intrinsic factors determine academic achievement in sciences.

In Thika West District, there is considerable evidence that resources among other factors are not adequately utilized in the teaching and learning of sciences as evidenced in KCSE exams shown in Table 1.1. Studies on factors influencing poor performance in science subjects as indicated by; Munyalo (2006), Gichura (1999), Kakonge (2000), Kunguru (1986) have revealed one common factor, inadequate utilization of resources. Orodho (1996) in his study noted that it is more of the effective use made of learning resources such as textbooks, lab equipment and apparatus that result into higher achievement in sciences.

The (Sessional Paper no.1, 2005) and Daily Nation (17th September 2010) noted that the trend in performance in Mathematics and sciences continue to be dismal. Thika West District is not an exceptional in the poor performance in the science subjects as the K.C.S.E. Exam analysis for the last five years below shows;

Table 1.1 K.C.S.E. Exam analysis for the last five years

YEAR	CHEMISTRY MEAN SCORE	OPTIMUM SCORE	BIOLOGY MEAN SCORE	OPTIMUM SCORE	PHYSICS MEAN SCORE	OPTIMUM SCORE
2005	3.348	12.0	3.621	12.0	4.932	12.0
2006	3.605	12.0	3.819	12.0	5.095	12.0
2007	3.944	12.0	4.866	12.0	5.132	12.0
2008	3.637	12.0	4.294	12.0	4.835	12.0
2009	3.500	12.0	3.790	12.0	5.183	12.0

NB. Physics is done by few schools and it's optional

SOURCE; THIKA DISTRICT KCSE RESULT ANALYSIS FILE FROM DEOs OFFICE

From the various works done by other researchers like (Gichuru, 1999: Kinyagia, 1987, Kunguru, 1986) whose work is consulted, Some of the possible causes of the poor performance in sciences includes; negative attitude towards the subject, higher pupil-textbook ratio, shortage of science teachers, high work load due to overburdened

programme which cause academic and teaching methodology to suffer and lack of adequate resources and their effective use in learning-teaching of science subjects.

Performance and utilization of resources in the learning/ teaching of sciences could be affected by student related barriers, teacher related barriers, or school related barriers.

Some of Student related barriers could include; indiscipline. Disciplined students use resources, following stated instructions without mishandling or destroying them while undisciplined ones mishandle and destroy them. Therefore for effective utilization of resources students need to be highly disciplined (Gichara, 1999). According to Muhandik (1983), negative attitude towards the subjects cause students to perform poorly due to lack of interest in the subject. Poor social-economic background cause learners to be away from school and this hinders good performance.

Teacher related factors include- teacher qualifications - to a good extent teacher qualification and experience determine student's performance. A well qualified and experienced teacher produces good performance (Saha, 1983). Teachers work- load also determine performance. If the teacher has few lessons, most likely he//she will be able to give individual attention to the students and consistently evaluate and mark giving feedback immediately. The methods of teaching the teacher uses also determine understanding and consequently performance. According to Schulman (1973), activity oriented method is the best where the learner is highly involved and thus motivated raising interest and curiosity to learn.

School-related barriers that could have an effect on utilization of resources and consequently performance are; Physical component- these includes space available (class size) for all the learning/teaching activities and its suitability, social component which

should include relationships amongst students, among the teachers and students, students and non-teaching staff (Nieuwenhuis, 2001) .This is very crucial for the schools effective academic performance. The school as a whole should have a healthy relationship.

Previous studies by (Munyalo, 2006; Gichura, 1999; Kakonge, 2000; Kunguru, 1986; Orodho 1996) and from KCSE results from national to district level, including Thika West District as shown in Table 1.1 shows evidence that resources are not adequately utilized. Towards this end, in 1998, the government through the Ministry of Education and the government of Japan through Japan International Co-operation Agency (JICA) started a technical co-operation project as an intervention to the existing problem of performance. The project is known as strengthening of Mathematics and Sciences in Secondary School Education (SMASSE) in Kenya. Its overall national goals are to upgrade the capability of Kenyan teachers in the teaching of mathematics and sciences. This was done by providing learning/teaching resources and other material support. This programme stresses the importance of resources for teaching and learning of sciences in the classroom. Despite the training of science teacher in SMASSE activities, for example ASEI/PDSI approach in teaching the expected impact has not been achieved yet.

1.2 Statement of the Problem

As revealed in the background of the study, secondary schools in Kenya do not adequately utilize resources in the teaching and learning of sciences. This has been evidenced by the persistent poor performance in the sciences. To ameliorate the problem, the MOE in conjunction with Japanese Government initiated the SMASSE project in 1988 as a pilot. The mandate of the project mainly focuses on in- servicing science teachers especially in the use of resources while teaching sciences. The Government

under targeted programs also provides laboratory equipment in some schools including schools in Thika West District.

In spite of the intervention put in place, performance in the science subjects in the K.C.S.E level continues to be dismal, thus the study attempted to examine hindrances to effective utilization of resources in the learning-teaching of sciences in public secondary schools in Thika West District, as one of the assumed cause of dismal performance in sciences.

1.3 Purpose of the Study

The purpose of the study was to determine the factors that hinder effective utilization of resources in the teaching-learning of sciences in secondary schools in Thika West District.

1.4 Objectives of the Study

The study was guided by the following research objectives:

- (i) To investigate the adequacy of available resources in the learning -teaching of sciences in public secondary schools in Thika West District.
- (ii) To determine the teacher-related barriers that hinder effective utilization of resources in the teaching of sciences in public schools in Thika West District.
- (iii) To determine the student related barriers that hinder effective utilization of resources in the learning of sciences in public-secondary schools in Thika West.
- (iv) To determine school-related barriers that hinder effective utilization of resources in the learning-teaching of sciences in public secondary schools in Thika West District.

1.5 Research Questions

The study was guided by the following research questions:

- (i) Are resources adequate for the learning-teaching of sciences in the public secondary schools in Thika West District?
- (ii) What teacher related barriers hinder adequate and effective utilization of resources in the teaching of sciences in public secondary schools in Thika West District?
- (iii) What learner-related barriers hinder effective utilization of resources in the learning of sciences in public secondary schools in Thika West District?
- (iv) Which school-related barriers hinder effective utilization of resources in learning-teaching of sciences in public secondary schools in Thika West District?

1.6 Significance of the Study

This study may be significant in the following ways;

- (i) It provides data on the variety and state of resources in secondary schools for learning-teaching of sciences which would be helpful to curriculum implementers and planners.
- (ii) The findings encourage the Ministry of Education to design teacher training programme and in-service courses to facilitate better understanding and use of resources and inculcate in teachers a positive attitude toward use of resources.
- (iii) The findings enable the Ministry of Education to know and deal with the problems facing teachers in using instructional resources in secondary schools.

1.7 Limitations and Delimitations

1.7.1 Limitations

The study covered only the secondary schools in Thika West District. This is due to proximity thus reducing cost of travel and time consumed as the researcher is a full time teacher.

1.7.2 Delimitation

Due to time and fund limits, the research was carried during the researcher's free time as the normal core duties had to be attended to. Respondents were teachers currently teaching the sciences and students learning science. The study was conducted in public secondary schools only.

1.8 Assumption

In the proposed study, the following assumptions were made:

- (i) The schools considered had some resources for the teaching and learning of sciences.
- (ii) The respondents would cooperate and provide reliable responses.
- (iii) Students value the importance of science subjects after Secondary School Education.

1.9 Theoretical Framework

The study was based on use the constructivist theory by Dewey who originated in Russia from 1919 onwards. It can be traced to the 18th century from the work of the philosopher Giambattista Vico who maintained that humans can understand better only what they have themselves constructed. Educationists have worked with this idea Rorty (1991) for example, argued that knowledge is a construction by individuals and is relative to the current context (community). However the first major contemporary to develop a clear

idea of what constructivism consists was John Dewey. He was an American educationist of the 19th century and was the greatest proponent of situated learning and learning by doing. He argued that education is not preparation for life but it is life itself. He had attended a seminar on Mathematics and sciences.

For Dewey (1916), schools functioned contrary to the way in which thinking and learning occur in the natural world. Teachers tell learners what and when to learn where as in nature thinking and learning are stimulated by problems encountered by the individual.

Nature requires learners to be active participants in problem solving, but in schools learners are very often passive recipients of knowledge. Dewey (1938) held that schools should engage learners in meaningful problem solving activities otherwise the information may remain as static information in the memory of the learner (which is called "cold storage"). He also stressed the importance of learners working together in solving a problem. The teacher's task being to provide the opportunities that will stimulate thinking and discussion. Therefore, Dewey believed that children should learn 'by doing' and not idle, passive recipient of knowledge poured in by teachers. The learning by doing is at the heart of experiential learning. Constructive concern is to send light on the learner as an important agent in the learning process. It's the learner who interacts with his or her environment and thus gains an understanding of its features and characteristics. Constructivism allows students to gain the pre-existing knowledge and the ability to understand how ideas can relate to each other.

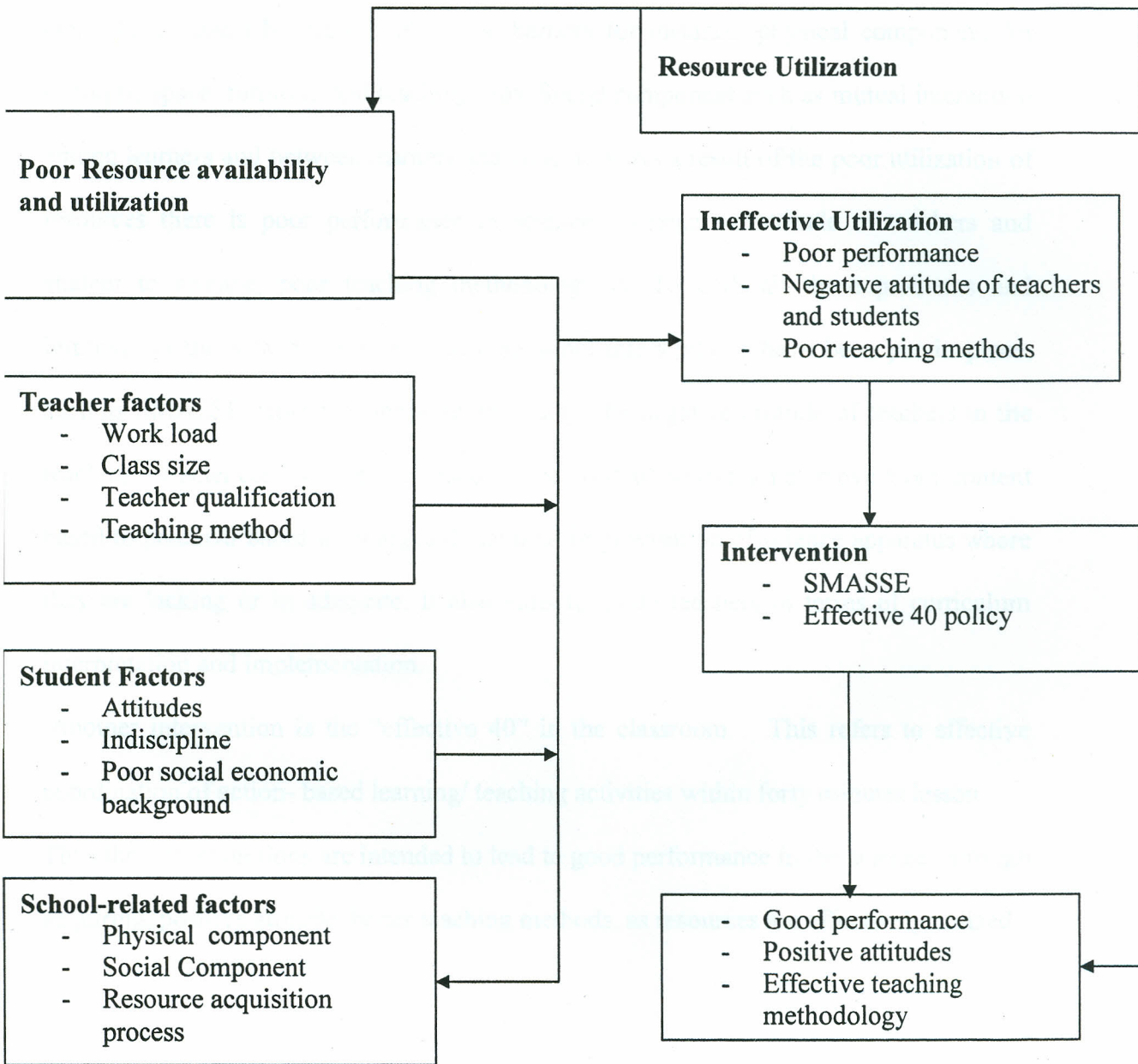
The obvious implication of Dewey's theory to the project is that students must be engaged in meaningful activities that induce them to apply the concepts they are trying to learn. In the learning of sciences, for good achievement to be acquired, numerous

activities especially in the practical work must accompany the learning process. These activities should be student-centered where they manipulate the available and relevant resources effectively with the guidance from the science teachers without any hindrances.



1.10 The Conceptual Framework

Figure 1: A schematic diagram showing causes and effects of poor utilization of resources and possible remedies



Source; Researcher

Figure 1.2: Conceptual Framework

In figure 1 above, in the teaching of sciences , poor resources utilization could be attributed to teacher related factors such as teacher qualification, teacher's ability and knowledge in resource utilization, attitude, work load, teacher-pupil ratio , etc.

Other causes could be student's related barrier such as: attitude, gender factor, poverty etc. Others could be the school-related barriers for instance, physical component, for example, space, furniture and teaching-aids. Social component such as mutual interaction among learners and between learners and educators. As a result of the poor utilization of resources there is poor performance in sciences, a negative attitude of teachers and student to science, poor teaching methodology etc. To curb all these problems and improve on the science teaching/ learning some interventions have been put in place, such as SMASSE project which aims to change the negative attitude of teachers in the teaching of sciences, change the teaching methods of sciences i.e. move from content based to practical based teaching and learning, improvisation of science apparatus where they are lacking or in adequate. It also aims to guide teachers in terms of curriculum interpretation and implementation.

Another intervention is the "effective 40" in the classroom. This refers to effective coordination of action- based learning/ teaching activities within forty minutes lesson.

Thus these interventions are intended to lead to good performance in the sciences through acquiring, positive attitude, better teaching methods, as resources are effectively utilized.

1.11 Operational Definition of Central Terms

Attitude - Learned predisposition to respond in a constantly favorable or unfavorable manner with respect to a given science subject.

Barriers - Refers to that which blocks or hinders or prevents effective use of resources in the teaching of sciences.

Class Size – This is the number of students in a given class for the purpose of teaching.

Effectiveness – Subject mean above 5.0

Sciences - refers to the three subjects, chemistry, biology and physics taught in secondary school curriculum

Teaching and Learning resources- Refers to human , material ,and physical resources, e.g. teachers and lab assistants , textbooks, stationary, chemicals and laboratories, classes an equipment respectively.

Teaching Load - Total number of lessons taught by science teachers in a week.

Utilization -Making effective use of resources

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this chapter, the researcher reviewed literature on barriers to effective resource utilization as it relates to the teacher, to the learner and to the school environment where teaching and learning takes place. Interventions to barriers are also discussed.

2.1 The Importance of Resource Utilization

Schools are established to implement national education curriculum (Oluoch, 1990)

This they do by ensuring effective teaching and learning. The quality of curriculum implementation in a school is closely related to the nature and quality of resources available and how well they are used.

At independence, Kenya faced the problem of provision of adequate illustrational resources. The Republic of Kenya (1976), recommended that resources be made available to the learners in adequate qualities and quantities and at an affordable cost. Republic of Kenya (1988, also had a number of recommendations with far-reaching effects to the teaching and learning of sciences. It observed that because of the vocational orientation of the present curriculum its implementation required the provision of additional and appropriate physical facilities, equipment, teaching learning materials and qualified teachers, therefore the idea of cost sharing in education between the government and local community parent and beneficiaries of education was recommended. The report also recommended that the local industries and entrepreneurs be encouraged to manufacture science, vocational, technical and other equipment and materials which could be used by educational training and institutions.

The implementation of these recommendations effectively placed the responsibilities of providing resources on the parents and local communities. This means that teachers now have some influence on the resource that is acquired because parents and local communities rely on their advice.

Lee, (1970) noted that the use of resources in teaching helps bring situations into the classroom context. According to Wright (1976), resources help to create situations that make learning interesting or else they inhibit learning. Resources serve to stimulate learners/ imagination. It also enhances memory of what is learned. It encourages learners to use more than one sense. Metcalf (1997) advocates for direct experiences and says;

You remember 10% of what you read
You remember 20% of what you hear
You remember 30% of what you see
You remember 50 % of what you see and hear
You remember 70% of what you say
You remember 90% of what you do and say

He goes further to conclude with a famous Chinese saying;

If I hear, I forget
If I see, I remember
If I do, I understand

Instructional materials when available and used well make learning easier especially when abstract concepts are being learned. Learners are enabled to form ideas effectively. It is therefore important that each school make appropriate and maximum use of available resources in addition to carefully monitoring and controlling the use. For this reason the teacher resorts to the use of various resources and organizes learners in varying ways in order to facilitate learning and help learners achieve specific learning goals Gerlach and Ely (1971).

According to Russel Molenda and Heinich (1985), learners have progressively observed more information and vicariously experienced many phenomena than people of yester-

years. As a result, proper and creative use of resources can provide hitherto unattainable opportunities to individualize and humanize the teaching learning process.

Ornestein and Levine (1997) say that various observation have been made that some learners do not learn when instruction begin with obstruction. They therefore recommended that teachers should allow more physical movement, present concrete material before abstractions, provide opportunities for students to learn in pairs or co-operative groups and take other steps that accommodate different behavior patterns and learning styles.

There is a wide range of resources to opt for; Dale (1969) therefore recommends that teachers should learn how to use resources effectively. Science teachers therefore need to be aware of these resources and have a positive attitude towards their usage in order to be reliable advisors. Several factors may hinder the effective utilization of these resources as shown below.

2.2 Availability of Teaching/Learning Resources

Learning/ teaching resources are meant to facilitate teaching and learning. Teaching aids are extremely important in enhancing the teaching and learning process. Teaching and learning resources includes materials like printed instructional media these are text books, teacher's guides, revision books, specimens and sides and microscopes in Biology. Other key resources are the laboratory and laboratory equipment / apparatus, materials and Chemicals used mainly in teaching Chemistry. These serves to facilitate individualization of instruction by allowing students to proceed at own pace of study, according to what they are interested in. They also facilitate organization and unification of instruction by providing common reading experience, suggested activities, questions, etc. They also

improve the teacher's skills by offering different approaches of handling lessons on particular topic.

Student's performance in practical work is determined by proper use of laboratory tools and the correct execution of procedural techniques. This work is done in the laboratory or its equivalent. The availability of a wide range of teaching and learning resources is critical in facilitating teaching and learning. Obonyo (1987) did a case study in private schools in Kisumu Municipality on the impact of teaching aids in secondary school in KCSE. He agreed with the theory that teaching resources enhance retention of about 80% of what was learnt. He also noted that instructional materials not only enhance communication between teachers and learners but also facilitated child - centered learning through discovery.

Teaching learning resources motivate and encourage participation by the learners in the learning process and add meanings. Textbooks and other teaching/ learning resources however can only facilitate learning if they are compatible with instructional objectives.

Ayoo (2002) did a study on factors affecting student's performance in KCSE in public schools in Maseno Division. He noted that adequate facilities recorded satisfactory or good performance. He concluded that the presence or absence of school facilities distinguished between high and low achieving schools.

Kyalo and Kithuka (1984) during a seminar organized by the centre for curriculum studies in Kenya at Kenyatta University presented a seminar paper on curriculum evaluation and the role of KNEC. They established that lack of teaching equipment in most rural schools discouraged teachers from doing their best. They found out that well equipped schools would motivate teachers to facilitate learning. They however noted that

teachers were not innovative enough and failed to improvise the resources available in the school environment. SMASSE (2004) findings indicated that no single textbook was sufficient for proper planning of successful lesson and indeed a variety of textbooks should be used. Text books therefore need to be selected carefully and used with great skill if they are to assist teachers and learners to accomplish meaningful learning and achieve the set objectives. The study therefore sought to assess the available teaching /learning resources in the public secondary schools for their effective utilization in the teaching of sciences.

2.3 Teacher-Related Hindrances to Effective Utilization of Resources

The teacher as a principle resource in the teaching of science may contribute to the barriers to effective utilization of resources. Some of these barriers could be poor qualification, teaching load, class size and instructional methods applied as stipulated below.

2.3.1 Qualification of Teachers

The teacher resource is one of the most important inputs in to the education system thus efficient management and utilization of resources is critical to the quality of learning outcomes G.O.K, (2005) The role of a teacher in learning is central. Apart from being conversant with the content he/she also needs to be able to deliver it appropriately by use of a variety of resources. The government thus should provide qualified teachers who are central to ensuring the provision of quality education in science. The Teachers Service Commission (TSC) has been carrying out a balancing exercise to move teachers from overstaffed areas to understaffed areas but this exercise faces major resistance. As a result, difficult and remote areas continue to suffer teacher shortages Teachers image,

(vol.10). The teachers should be trained in public universities or diploma colleges and it's imperative that the teacher should acquire sufficient subject mastery and pedagogy (Sessional Paper No.1 2005).The teacher's quality is reflected in the teaching methods which involve selection of resources to be utilized during the teaching-learning sessions. Resource selection and utilization is directly related to the teacher knowledge and experience, thus a well trained teacher is expected to effectively utilize the available resources in the teaching of sciences.

Saha (1983) noted that the better trained teacher produces better result. The cumulative findings strongly support the notion that trained teachers do make a difference for more advanced grades, especially for more difficult subjects". Muhandik (1983) agreed that a professionally trained teacher contribute positively to effective learning than untrained. Thus a well trained teacher is expected to effectively utilize the teaching-learning resources as he effectively teaches.

In a classroom, the teacher ceases from being a teacher but a facilitator, as a manager and no longer the main source of knowledge (Barr & Tagg 1995). Educational innovations make the teachers' job more complex and demand greater skill Zabel & Zabel (1996)

This therefore shows how the teacher needs not only to be available but also need to have the relevant skills to successfully deliver using available resources.

2.3.2 Teaching Load

This refers to the number of lessons a teacher teaches per week. If a teacher is handling too many lessons per week no matter how motivated, he/she will be overworked. Most likely the teacher will not be in a position to prepare well. He/she may not even have time to organize for hands- on activities in the laboratory which require pre-arrangement.

The Government Policy of freezing of teacher recruitment, continued retirements and resignation has led to an acute shortage of teachers in the country since there is no replacement. This has a direct impact on the teachers teaching load.

Njuguna (2004) while quoting from (the Dairy Nation issue of 18th march 2002, 15), observes that even experts were alarmed over shortage of teachers. The article noted that shortage of teachers continued to bite, threatening the provision of quality education. The overloading of science teachers may lead to minimal utilization of resources especially laboratory equipment/ chemicals in teaching of sciences.

2.3.3 Class Size

Large class sizes have an adverse impact in teaching and learning of sciences. Brown, & Harde (1969) & Witich & Schuller (1973) observe that increased student population work against effective resource usage because availability of resource may not be adequate. Nieuwenhuis (2000) noted that many teachers who work in overcrowded classes have low morale and self esteem. Motivation suffers and classroom teaching methods are restricted to lecturing, thus students will lack the opportunity to discover on their own in hands-on activities with overcrowded classrooms.

New and more dynamic teaching strategies and techniques cannot be implemented. Also such classes burden teachers with an increased workload. This leaves less time for dealing with other duties teachers must attend to. Another effect on large class size is on students' behavior. Research indicate that increased class size have a detrimental effect on students' behavior as such reduce the opportunity for schools to provide quality teaching and resource utilization needed to enhance student learning and achievement.

Student and teacher can get to know one another and the teacher can much more readily identify the strength and weaknesses of each of the students. (Nieuwenhuis (2001).

Increasing class sizes is contributing factors to the growing problems of a teacher, for instance, lack of motivation, getting stressed, absenteeism, burn out and early retirement from the profession. Lack of experienced teachers just compounds the problem. The study sought to find out how the class size affects effective utilization of resource in teaching sciences in public secondary schools in Thika West District.

2.3.4 Teaching methods

There are several instructional methods that teachers apply in the teaching/ process such as the teacher centered methods and the students centered methods of teaching.

Science teaching advocates for the latter where learners are self directed, once they are guided, the teachers' plans and organizes for learning activities where learners will be fully involved. In sciences, various apparatus and chemical are utilized during the lessons. The teacher's role during the individual practice will be to monitor students progress i.e. manipulation of the apparatus, observation making technique, and observation recording and interpretation. This gives the learner autonomy and makes the learning interesting. Sometimes the teacher may opt to use other methods i.e. lecturing method depending on the situations, (Brown 1987). In such situations, the learners will be least involved and may be bored and not grasp the concept. (Onyango, 1984) noted that lecture and teacher-centered methods continue to be in considerable use in many schools. Therefore utilization of resources depends highly on the instructional method the teacher chooses to apply in the teaching/learning process. For the science teachers it is imperative

that they choose one that engages learners in various hands on activities. If otherwise, both learners and teachers get bored in the process.

2.4 Student Related Factors

Several factors have been identified as being responsible for poor utilization of learning resources among students. This includes negative attitudes, poverty, classroom-environment and indiscipline.

2.4.1 Attitudes

Attitudes are learned predispositions to respond in a constantly favorable or unfavorable manner, with respect to a given object, situation or event. It's reflected in how one feels about and acts towards objects and ideas. It can either be positive or negative feeling that an individual holds about objects, persons or ideas. A student with positive attitude enjoys studying sciences and will put more effort. The positive attitude motivates the learner to be actively involved in the learning process. Veenma, (1984) noted that motivation to both teacher and student is a pre-cursor to the learning of sciences and determines the attitude.

Attitudes are learnt and not innate thus they can be modified by experience and persuasion. Cockroft (1982) noted that there is no area of knowledge where a teacher has more influence over the attitude as well as the understanding of his pupils than in sciences.

In the teaching of sciences, positive attitude is inculcated through involving learners in hands-on-activities in the laboratory. Learners get excited, happy and interested in the group activities as well as the lesson as a whole. This laboratory facilities and chemicals in every school ought to be available and adequate. Performance in the sciences also

determines the attitude. Poor performance cause negative attitude and vice versa. In this study the attitude of learners towards the sciences was determined in the selected schools of study.

2.4.2 Indiscipline

School discipline in legal notice no.40 of Education act Cap.211 of (1968) indicates that the school among other things is expected to promote among its pupils good behavior and acceptable moral and social conduct. Any action or behavior which is not in conformity with these acceptable norms constitutes indiscipline (Ouya & Mweseti 2009). The teaching of sciences requires students to be well disciplined to be able to carry out their practical activities successively without breakages of apparatus and understand the science concepts well. When the learners are disciplined, the teacher is motivated to give them more practical and extra coaching on areas of concern, contrary to when they are indiscipline.

2.4.3 Poor Social-Economic Background

A basic link exists between poverty and learning. A great deal of research shows that poverty is related to lower achievement in school and to greater risk of dropping out. (Jaeger, 1992). Parents who have low-income may fail to provide fees and the basics for the learner causing them to be sent home, cutting him/her off from all school activities where most resources are utilized. Learners from poor families in most cases are depressed, as they reflect on the situations at home. Mostly, during the teaching and learning process they switch off most often and this hinder them from effective utilization of resources, for instance, they lack concentration in listening to the teacher, reading of books, involvement in learning activities in progress during learning.

2.5 Environment –Related Barriers

2.5.1 Social component

Social component aspect of environment is created by mutual interaction among learners and between learners and the teacher. The classroom must be inviting for learners to feel at home there. The teacher and any teaching aid he/she uses must be visible. Area of learners' movement should be free of obstacles. According to Doyle (1986), the orderly course of the teaching and learning activities in an orderly environment provides the basis for the educator's classroom management and effective utilization of resources by students. A good mutual interaction amongst the learners and between learners and the teacher should exist for effective utilization of resources (Nieuwenhuis, 2001)

2.5.2 Resource Acquisition in the School

In a school, the head teacher is in charge of all the resources in terms of procurement, apportionment and management. As the manager, he/she should identify the resources that are needed and how they could be obtained. This responsibility should be delegated to the Head of Department. The resources must be ordered in good time to ensure that they are available when needed. The departmental procurement policy should be followed and the guidelines should be implemented meticulously, Jomo Kenyatta Foundation (1999).

Apportionment of these resources should be done in good time to avoid unnecessary delays and the necessary records should be well kept. The resources of a school should be managed effectively. This entails managing the resource use, storing resources safely, monitoring the use of resources and regular auditing of resources to ensure they are not lost damaged or destroyed (Nieuwenhuis, 2001).

The researcher intends to investigate from the schools to be chosen for the study whether the resource procurement procedures are followed, how the resource apportionment is done and how they are maintained to ensure the teacher and the learner are not inconvenienced during their use in the teaching /learning process.

The factors may not have been exhaustibly considered; therefore the researcher considered a few factors of which she feels may probably have an adverse barrier effect in the teaching of sciences.

2.6. Summary of related studies

Obonyo (1987) did a case study in private schools in Kisumu municipality on the impact of teaching aids in secondary schools in K.C.S.E. He noted that instructional materials not only enhance communication between teachers and learners but also facilitate child-centered learning through discovery. He did his work in Kisumu and in private secondary schools, hence the need to find the situation in public secondary schools in Thika West District.

Gichura (1999) in her study on factors influencing science performance amongst girls in public secondary schools in Nairobi province noted that science resources need to be available. She did not consider whether they are effectively used or not. She also did the study in Nairobi province but not in Thika West District.

Ayoo (2002) in his investigation on factors affecting students' performance in K.C.S.E in public schools in Maseno Division, he noted that adequate resources/ facilities recorded satisfactory or good performance and he concluded that the presence of school facilities distinguished between high and low achieving schools. From his work a gap exist because the presence of resources alone without ensuring they are being effectively

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This section discussed the research design, the locale of the study, target population, sampling strategies, research instruments, and the method used for data collection and analysis.

3.1 Research design

It is a programme to guide the researcher in collecting, analyzing and interpreting observed facts Orodho (2008). The study adopted a descriptive research design which involved collecting information by administering questionnaires to a sample of individuals, check resources available for teaching sciences by use of checklist. And use of classroom observation guide. The design determined and reported the ways things are, further it attempted to describe such things as attitudes, possible behavior values and characteristics. The choice of this design was based upon its ability to get information from a wide sample of respondents

3.2 Locale

The research was conducted in Thika West District. The investigator comes from the District; hence she is very conversant with the locale. Also the researcher chose this District because after going round in the district with other SMASSE District trainers, monitoring the impact of SMASSE in the teaching and learning of sciences, she noted that chemicals and apparatus especially in the laboratories were left lying idle and unpacked suggesting that they are rarely used or never used at all, hence the need to investigate what was hindering their utilization.

utilized may not produce good result and again resources alone may not determine performance.

Mogeni (2005) did a study on factors influencing utilization of resources in teaching Kiswahili in public schools in Transmara District in Kenya. He considered resources in teaching Kiswahili but not sciences and also did his work in Transmara District, hence the need to find out the situation in Thika West District.

Simiyu (2007) did her study on factors influencing availability and utilization of instructional resources in teaching Kiswahili in Githunguri Division, She considered resources in teaching Kiswahili but not in teaching the sciences. She also considered impediments to using resources among teachers but never considered among students.

From the above findings therefore, there is need to find out whether adequate required resources in teaching sciences exist and what hinders their effective use in the learning/teaching of sciences in public secondary schools in Thika West District.

3.3 Target population

The study targeted all students and all science teachers in public secondary schools in the new Thika West District. The district has 16 public secondary schools which have seventy science teachers teaching chemistry, biology, and physics. Both male and female teachers in sciences were involved including the heads of departments.

Students were chosen from form three classes because from their nature of topics in the syllabus they are supposed to involve more practical work during the learning process than any of the other classes.

Table 3.1 Target population

Category of schools	Target population	Sample size
National	4	2
Provincial	3	3
District	9	3
Total	16	8

3.4 Sampling Procedures

According to Orodho (2008), sampling is the process of selecting a subset of cases, in order to draw conclusions about entire set. Sampling is advantageous in that it saves time and money. It may be the only practical way to collect data.

National schools, four from each of the three (3) Provincial schools and four (4) from each of the three District schools were chosen. Out of the fourteen schools, eight (8) were sampled. The researcher chose schools per the categories national, provincial, and district. Both boarding and day schools were considered as well as boys and girls schools. All the categories of schools were represented during sampling. Among the teacher

population, thirty two (32) teachers were sampled; four from each of the school. The four were to be science teachers teaching either Chemistry, Biology, or Physics from each school. In each school, ten (10) form three students were given the questionnaires. Purposive sampling method was used which intentionally choose subjects so as to ensure representation of all important groups in the research.

3.5 Research Instruments

The researcher used questionnaires as the main instrument of data collection. There were two questionnaires used to gather information. One gathered information from science teachers while the other gathered information from form three students. Observation guide forms were used to check on the availability and utilization of resources available.

3.6 Piloting

This refers to trying out of questionnaires in selected schools to check on its effectiveness. It helps in identifying and correcting major defects before distributing in many schools (Oluoch, 1982). The validity of the questionnaire was determined through piloting in two secondary schools in the same area and was not included in the study. The pilot study revealed that the responses in the two tests were consistent therefore the instruments were reliable. This helped to establish that the instruments were able to measure what they were intended to measure. Vague questions were revealed and rectified accordingly. Through a Test-retest in piloting, the degree to which same results would be obtained is obtained, that is reliability.

3.7 Data Collection Procedures

The researcher sought permission from the Ministry of Education and from the D.E.O's Office in Thika where a permit (letter) was issued. The researcher then proceeded to schools under study and established a rapport with the principals first and then with the HOD sciences before administering the questionnaires to the science teachers and students. The teachers were given at least five days to fill after which the researcher collected them. In every school the researcher filled the observation guide form, and visited the laboratories to see the facilities and find out how well they were utilized during the learning process or from the laboratory technicians.

3.8 Data Analysis Procedure

Quantitative approach was used where data was extracted from the questionnaires. The qualitative and quantitative methods were used in analyzing the observation guides forms. Qualitative data was analyzed qualitatively using content analysis based on analysis of meanings and implications emanating from respondent information on open-ended questions and comparing responses to documented data on barriers to utilization of resources in the teaching of sciences. The qualitative data was presented thematically in line with the objectives of the study. Descriptive statistics, frequencies, percentages and measures of central tendencies i.e. mean were used in data analysis and was presented in simple statistics and as pie-charts, graphs, and percentages.

3.9 Ethical Issues

Before filling the instruments, the researcher explained to the teachers the purpose and nature of the study being carried in their schools. She then promised the teachers and students confidentiality pertaining to every information they would give.

Authority to move to various areas in the schools e.g. the laboratory, classes or staffroom was sought before-hand from the Principals.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter involves presentation of the data analysis and discussion of the results findings. The purpose of this study is to establish the barriers to effective utilization of resources in the teaching of sciences in secondary schools in Thika West District, teaching/learning problems encountered in the resource utilization in the teaching of sciences in schools in Thika District and in the country at large. The study has four research objectives:

- 1) To investigate the adequacy of available resources in the learning -teaching of sciences in public secondary schools in Thika West District.
- 2) To determine the teacher –related barriers that hinder effective utilization of resources in the teaching of sciences in public schools in Thika West District.
- 3) To determine the student related barriers that hinder effective utilization of resources in the learning of sciences in public secondary schools in Thika West.
- 4) To determine school-related barriers that hinder effective utilization of resources in the learning-teaching of sciences in public secondary schools in Thika West District.

Each of these objectives is discussed in this chapter.

4.2 Demographic data of respondents

The study was conducted in eight out of fourteen public secondary schools in Thika West District. The researcher targeted four teachers from each of the sampled schools. All the 32 teachers from the sample schools responded to the questionnaire designed by the researcher. The study also targeted 80 students that were sampled to participate in

the study. This means that the questionnaire return rate was 100%. Table 4.1 shows the respondents' gender.

Table 4.1 Respondents gender **N=32** **N=80**

Gender	Teachers		Students	
	F	%	F	%
Male	21	65.6	42	52.5
Female	11	34.4	38	47.5
Total	32	100.0	80	100.0

Table 4.1 above shows that there were 21 (65.6%) teachers who were males and 11 (34.4%) females. It also indicates that 42 (52.5%) of the students sampled were males and 38 (47.5%) females. Observation made here is that male dominate in sciences compared to the female gender. Figure 4.1 shows the respondents' age distribution.

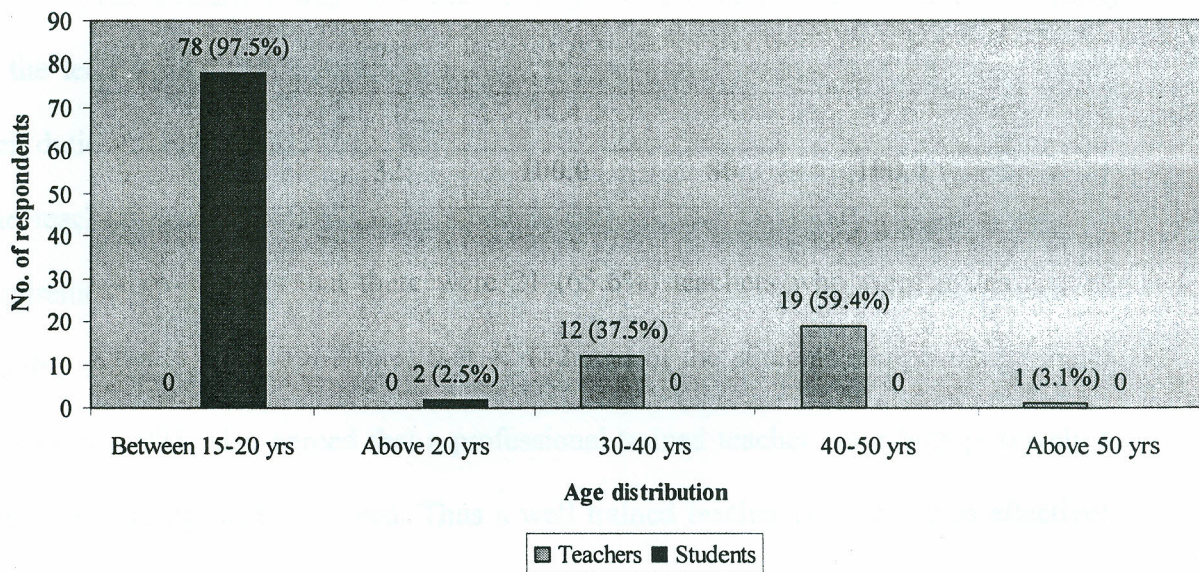


Figure 4.1: Age distribution

Figure 4.1 shows that, of the 32 teachers who responded, 19 (59.4%) were aged between 40-50 years, 12 (37.5%) were between 30-40 years, 1 (3.1%) was above 50 years and none was below the age of 30 years. On the other hand, 78 (97.5%) students were aged

between 15-20 years and only 2 (2.5%) were above 20 years. This shows that the majorities of the teachers were in their prime and would therefore be expected to perform their duties effectively, which includes effective utilization of teaching-learning resources. Table 4.2 shows the teachers' academic qualifications.

Table 4.2 Teachers' academic qualification

N=32

	Frequency	Percent
KACE	1	3.1
Diploma	9	28.1
Degree	17	53.1
Masters	5	15.6
Total	32	100.0

Table 4.2 indicates that, 17(53.1%) teachers had a degree, 9(28.1%) had a diploma, 5(15.6%) had a masters' degree, while 1(3.1%) had KACE. This shows that the majority of the teachers had high academic qualifications, which would enable them to handle their duties professionally.

The teachers should be trained in public universities or diploma colleges which is a requirement of the Ministry of Education and it's imperative that the teacher should acquire sufficient subject masterly and pedagogy (Sessional Paper No.1, 2005). Muhandik (1983) also agreed that a professional trained teacher contribute positively to effective learning than untrained. Thus a well trained teacher is expected to effectively utilize the teaching-learning resources as he effectively teaches. Table 4.3 shows the teachers' professional qualifications.

Table 4.3 Teachers' professional qualification**N=32**

	Frequency	Percent
PGDE	1	3.1
ATS	2	6.3
Dip. in Ed.	10	31.3
BED. Graduate	19	59.4
Total	32	100.0

Table 4.3 shows that 19 (59.4%) of the teachers had Degrees. Ten (31.3%) had a Diploma in Education, 2 (6.3%) had ATS and 1 (3.1%) had PGDE certificate.

The teacher's quality is reflected in the teaching methods which involve selection of resources to be utilized during the teaching-learning sessions. Resource selection and utilization is directly related to the teacher knowledge and experience, thus a well trained teacher is able to effectively utilize the available resources in the teaching of sciences (Muhandik, 1983).

Figure 4.2 shows the teachers' work experience as teachers

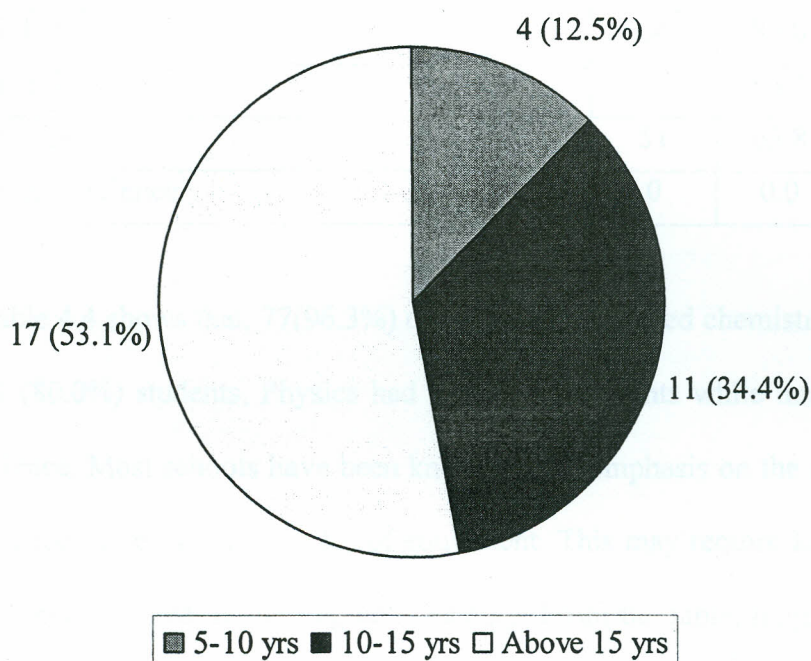


Figure 4.2: Teaching experience

Figure 4.2 shows that 17(53.1%) teachers had a teaching experience of above 15 years, 11(34.4%) had taught between 10-15 years while 4(12.5%) had an experience of between 5-10 years. The majority of the teachers had adequate experience to make them efficient and effective in their profession.

This study targeted students from form three only. Therefore all the 80 students sampled were in form three. This is because they have enough experience in high school to enable them to give the information needed in the study, and were also not encumbered by examination like the form fours, who would have otherwise been the best candidates for the study. The forms threes were also chosen because their syllabus contains more practical lessons than any other class. Table 4.4 shows the science subjects taken by the students.

Table 4.4 Science subjects taken by students**N=80**

Science subjects taken	Yes		No	
	F	%	F	%
Biology	64	80.0	16	20.0
Chemistry	77	96.3	3	3.8
Physics	51	63.8	29	36.3
General science	0	0.0	80	100.0

Table 4.4 shows that, 77(96.3%) of the students studied chemistry, Biology was taken by 64 (80.0%) students, Physics had 51(63.8%) students while none of them took general science. Most schools have been known to put emphasis on the science subjects, and the science subjects require a lot of equipment. This may require knowledge on their usage and maintenance in learning and teaching. From the table, majority of students (96.3%) chose chemistry, showing that it was their most preferred science subject.

Orpwood (2001) noted that instructional materials when available and used well make learning easier especially when abstract concepts are being learned. Learners are enabled to form ideas effectively. It is therefore important that each school make appropriate and maximum use of available resources in addition to carefully monitoring and controlling the use for this reason the teacher resorts to the use of various resources and organizes learners in varying ways in order to facilitate learning and help learners achieve specific learning goals (Gerlach and Ely 1971).

4.3 Available resources in the learning -teaching of sciences in public secondary school

The first objective of this study was to investigate the available resources in the learning -teaching of sciences in public secondary schools in Thika West District.

In order to address this objective, the teachers were presented with a number of statements showing resources that could influence learning/teaching of sciences. They were asked to indicate whether each of these facilities were adequate, inadequate or not available in their schools. Table 4.5 shows the adequacy of facilities.

Table 4.5 Adequacy of facilities/resources

N=32

Facilities/resources	Adequate		Inadequate		Not available	
	F	%	F	%	F	%
a) Teachers' reference books	25	78.1	7	21.9	0	0.0
b) Classrooms	19	59.4	13	40.6	0	0.0
c) Staff(lab technicians)	15	46.9	15	46.9	2	6.3
d) Teachers' guide books	15	46.9	16	50.0	1	3.1
e) Lab chemicals	15	46.9	17	53.1	0	0.0
f) Lab apparatus/Equipment	14	43.8	18	56.3	0	0.0
g) Students' text books	11	34.4	21	65.6	0	0.0
h) Improvised apparatus	9	28.1	15	46.9	8	25.0
i) Laboratories	9	28.1	23	71.9	0	0.0
j) Science teachers	8	25.0	24	75.0	0	0.0
k) Teaching aids	8	25.0	22	68.8	2	6.3
l) Library books	5	15.6	22	68.8	5	15.6

Table 4.5 shows that, 78.1% of the teachers responded that, the most adequate resources were teachers' reference books. On the other hand, the most inadequate facilities were science teachers as resources (75.0%) laboratories (71.9%), teaching aids (68.8%), library books (68.8%), students' text books (65.6%) and laboratory chemicals (53.1%). However, 25% teachers reported that improvised apparatus were not available in their school. Another 5(15.6%) teachers also reported that library books were not available. This implies that most of the facilities were inadequate, which may adversely affect the teaching-learning process and finally the performance of students.

Ayoo (2002) did a study on factors affecting student’s performance in KCSE in public schools in Maseno Division. He noted that adequate facilities recorded satisfactory or good performance. He concluded that the presence or absence of school facilities distinguished between high and low achieving schools. Table 4.6 shows the ratio of text books to students.

Table 4.6 Ratio of text books to students N=32

	Frequency	Percent
1:1	4	12.5
1:2	18	56.3
1:3	5	15.6
1:4	4	12.5
1:5	1	3.1
Total	32	100.0

Table 4.6 indicated that 18(56.3%) teachers reported the ratio of text books to the number of students as 1:2, 5(15.4) had it as 1:3, 4(12.5%) said the ratio was 1:1 and 1:4 while 1(3.1%) had a ratio of 1:5. This means that the class text books were mostly shared among the students in the ratio of 1:2, implying that they were adequate.

In a previous study, SMASSE findings (2004) indicated that no single textbook was sufficient for proper planning of successful lesson and indeed a variety of textbooks should be used. Text books therefore need to be selected carefully and used with great skill if they are to assist teachers and learners to accomplish meaningful learning and achieve the set objectives. Table 4.7a shows the students’ use of available resources.

Table 4.7a: Use of available resources

N=80

Statement	Never		Rarely		Sometimes		Often		Always	
	F	%	F	%	F	%	F	%	F	%
1. How often do you do experiments/activities?										
a) Chemistry	0	0.0	5	6.3	39	48.8	23	28.8	13	16.3
b) Physics	1	1.3	6	7.5	18	22.5	20	25.0	12	15.0
c) Biology	0	0.0	13	16.3	27	33.8	26	32.5	5	6.3
2. How often do you do group work										
a) Chemistry	28	35.0	19	23.8	19	23.8	12	15.0	2	2.5
b) Physics	21	26.3	14	17.5	10	12.5	8	10.0	4	5.0
c) Biology	20	25.0	16	20.0	14	17.5	17	21.3	4	5.0
3. How often do you do discuss results of experiments/activities										
a) Chemistry	4	5.0	5	6.3	15	18.8	14	17.5	42	52.5
b) Physics	5	6.3	7	8.8	11	13.8	7	8.8	27	33.8
c) Biology	6	7.5	11	13.8	12	15.0	8	10.0	33	41.3

Table 4.7a shows that, 48.8% of students do experiments /activities sometimes in Chemistry, 22.5% in physics, and 33.8% in Biology. Another 26(32.5%) students reported that they do experiments often in Biology and 23(28.8%) reported they often did experiments in Chemistry. However, 35.0% reported that they never did group work in Chemistry, 26.3% never did in Physics, and 25.0% never did in Biology. 19(23.8%) of the students said they rarely did group work in Chemistry subject. Another 17(21.3%) students reported that they often did group work in Biology. 52.5% of the students who responded reported that they always discussed the results of experiments/activities in Chemistry, 33.8 % in Physics and 41.3 % in Biology. However, 15(18.8%) students said they sometimes discuss the results in Chemistry subject.

From the data on Table 4.7, it's clear that Chemistry group work in class is the lowest, an indication that the science subjects were not being taught effectively.

Previous studies unveiled that student's performance in practical work is determined by proper use of laboratory tools and the correct execution of procedural techniques. This work is inadequately done in the laboratory or its equivalent. The availability of a wide range of teaching and learning resources is critical in facilitating teaching and learning.

Table 4.7b: Teachers assistance

N=80

Statement	Never		Rarely		Sometimes		Often		Always	
	F	%	F	%	F	%	F	%	F	%
4. Teacher always ready and willing to answer questions.										
a) Biology	1	1.3	2	2.5	6	7.5	6	7.5	56	70.0
b) Chemistry	2	2.5	2	2.5	6	7.5	10	12.5	60	75.0
c) Physics	2	2.5	1	1.3	5	6.3	4	5.0	45	56.3
5. Teacher always punctual in attending the lesson										
a) Biology	2	2.5	5	6.3	7	8.8	17	21.3	40	50.0
b) Chemistry	6	7.5	1	1.3	10	12.5	20	25.0	43	53.8
c) Physics	3	3.8	4	5.0	12	15.0	12	15.0	26	32.5
6. We are able to complete the syllabus on time.										
a) Biology	7	8.8	4	5.0	16	20.0	9	11.3	35	43.8
b) Chemistry	8	10.0	2	2.5	11	13.8	10	12.5	49	61.3
c) Physics	12	15.0	6	7.5	8	10.0	10	12.5	21	26.3

Table 4.7b shows that, 70% of the students who were sampled reported that their teachers were always ready and willing to answer questions in Biology, 75.0% in Chemistry and 56.3% in Physics. 13.8% of the students reported that their science teachers are always punctual in attending lessons. Another 20(25.0%) said their chemistry teachers are often punctual in lesson attendance. Only a few students reported that their science teachers are never punctual in lessons attendance. Forty nine (61.3 %) students of the total respondents indicated that they always complete the syllabus on time. Another 25.0 % said they never complete the syllabus on time for both Chemistry and Physics subjects.

A notable observation from the table is that despite physics being rated lowest in all categories of tables 4.7a and 4.7b, the performance of physics reflected in Table 1.1 is better than for chemistry and Biology.

Table 4.7c: Experiments

N=80

Statement	Never		Rarely		Sometimes		Often		Always	
	F	%	F	%	F	%	F	%	F	%
7. Five or more of us share apparatus in performing experiments										
a) Biology	3	3.8	7	8.8	10	12.5	13	16.3	38	47.5
b) Chemistry	10	12.5	9	11.3	14	17.5	13	16.3	34	42.5
c) Physics	9	11.3	7	8.8	6	7.5	11	13.8	24	30.0
8. During experiments apparatus are enough for activities										
a) Biology	12	15.0	7	8.8	12	15.0	9	11.3	31	38.8
b) Chemistry	14	17.5	11	13.8	13	16.3	5	6.3	37	46.3
c) Physics	10	12.5	7	8.8	9	11.3	5	6.3	26	32.5
9. We are tested after every topic										
a) Biology	21	26.3	8	10.0	13	16.3	6	7.5	23	28.8
b) Chemistry	17	21.3	9	11.3	7	8.8	10	12.5	37	46.3
c) Physics	17	21.3	8	10.0	5	6.3	8	10.0	19	23.8
10. We are involved in collecting practical learning materials										
a) Biology	12	15.0	10	12.5	16	20.0	10	12.5	23	28.8
b) Chemistry	33	41.3	13	16.3	9	11.3	8	10.0	17	21.3
c) Physics	22	27.5	9	11.3	10	12.5	6	7.5	10	12.5

Table 4.7c shows 47.5% of the students reported that 5 or more of the students always shared apparatus in performing experiments in Biology, 42.5% in Chemistry and 30.0% in Physics. 37 (46.3%) of the students indicated that during experiments, apparatus are always enough for activities in Chemistry. Another 37 (46.3%) of the students also reported that they were always tested after every topic in Chemistry, while 21 (26.3%) of them indicated that they were never tested after every topic in Biology. Thirty three (41.3%) of the students reported that they were never involved in collecting practical

learning materials in chemistry. This implies that the teaching of sciences involves few practical activities during the teaching / learning process in the classroom and this may greatly affect students' performance.

Table 4.7d: Class work

N=80

Statement	Never		Rarely		Sometimes		Often		Always	
	F	%	F	%	F	%	F	%	F	%
11. Our teachers mark our note books and assignments										
a) Biology	14	17.5	14	17.5	11	13.8	13	16.3	19	23.8
b) Chemistry	19	23.8	7	8.8	17	21.3	16	20.0	21	26.3
c) Physics	19	23.8	7	8.8	6	7.5	9	11.3	16	20.0
12. we carry experiments during double lessons										
a) Biology	1	1.3	7	8.8	19	23.8	16	20.0	28	35.0
b) Chemistry	1	1.3	9	11.3	17	21.3	18	22.5	35	43.8
c) Physics	1	1.3	5	6.3	16	20.0	9	11.3	26	32.5
13. Our teachers appreciates those who attempts to answer question										
a) Biology	9	11.3	4	5.0	11	13.8	13	16.3	34	42.5
b) Chemistry	8	10.0	3	3.8	6	7.5	12	15.0	51	63.8
c) Physics	7	8.8	6	7.5	2	2.5	11	13.8	31	38.8
14. We are allowed to comment how the lesson was taught										
a) Biology	47	58.8	8	10.0	5	6.3	4	5.0	7	8.8
b) Chemistry	48	60.0	11	13.8	7	8.8	4	5.0	10	12.5
c) Physics	31	38.8	8	10.0	5	6.3	4	5.0	9	11.3

Table 4.7d shows that 19 (23.8%) of the students in Chemistry and 19 (23.8%) in Physics reported that their teachers never marked their note books and assignments in Chemistry and Physics. However, the same percentage (23.8%) of them indicated that teachers always marked their assignments in Biology. 35.0% of the students reported that they carried out experiments during double lessons in Biology, 43.8% carried in Chemistry and 32.5% carried in Physics. Fifty one (63.8%) of the students reported that their Chemistry teachers always appreciated those who attempt to answer questions. However,

48 (60%) and 47 (58.8%) of the students indicated that they were never allowed to comment on how the lesson was taught in Chemistry and Biology respectively. This shows that teachers rarely mark Chemistry and Physics note books and assignments. They also do not involve students in lesson evaluation after discussion in order to identify areas of weakness for the purpose of improvement.

In a previous study, Kyalo and Kithuka, (1984) during a seminar organized by the centre for curriculum studies in Kenya at Kenyatta University presented a seminar paper on curriculum evaluation and the role of KNEC. They established that lack of teaching equipment in most rural schools discouraged teachers from doing their best. They found out that well equipped schools would motivate teachers to facilitate learning. They however noted that teachers were not innovative enough and failed to improvise the resources available in the school environment.

4.4 Teacher related factors that hinder effective utilization of resources

The second objective of this study was to determine the teacher –related factors that hinder effective utilization of resources in the teaching of sciences in public schools in Thika West District. The teachers were provided with a number of statements relating to factors that hinder effective utilization of resources in public schools. They were to indicate whether they agreed or disagreed with each of these factors on a 5-point likert scale. Table 4.8 shows teacher-related factors that hinder effective utilization of resources.

Table 4.8 Teacher related factors

N=32

Statement	SD		D		U		A		SA	
	F	%	F	%	F	%	F	%	F	%
a) Sciences are easy subjects to teach	3	9.4	14	43.8	2	6.3	12	37.5	1	3.1
b) Girls are equally capable of excel	0	0.0	0	0.0	1	3.1	23	71.9	8	25.0
c) Science should be optional in form 3and4	7	21.9	3	9.4	1	3.1	17	53.1	4	12.5
d) I believe my students can pass in science	0	0.0	2	6.3	0	0.0	21	65.6	9	28.1
e) responsible for my students' performance	1	3.1	18	56.3	3	9.4	9	28.1	1	3.1
f) Science concepts can't be understood	4	12.5	13	40.6	0	0.0	11	34.4	4	12.5
g) Sciences are difficult to teach	4	12.5	15	46.9	0	0.0	11	34.4	2	6.3
h) Science develop reasoning and are stimulating	0	0.0	4	12.5	0	0.0	12	37.5	16	50.0
i) Classes are too overcrowded therefore equipment is inadequate	7	21.9	3	9.4	1	3.1	17	53.1	4	12.5

Key: Strongly Disagree (SD), Disagree (D), Undecided (U), Agree (A), Strongly Agree (SA)

Table 4.8 above shows that a number of teachers agreed that; girls are equally capable of excel (71.9%), science should be optional in form 3 4(53.1%), they believe their students can pass in science (65.6%) and science develop reasoning and are stimulating (50.0%). However (43.8%) of teachers disagreed on statements like; sciences are easy subjects to teach, they are responsible for their students' performance (56.3%), science concepts can't be understood (40.6%) and that sciences are difficult to teach (46.9%). This implies that teachers had a positive attitude towards science subjects, which they would likely impart on their students.

In a classroom, the teacher ceases from being a teacher but a facilitator, as a manager and no longer the main source of knowledge, (Barr & Tagg, 1995). Educational innovations

make the teachers' job more complex and demand greater skill (Zabel & Zabel, 1996). This therefore shows how the teacher needs not only to be available but also need to have the relevant skills to successfully deliver using available resources.

Figure 4.3 shows the teachers' workload per week.

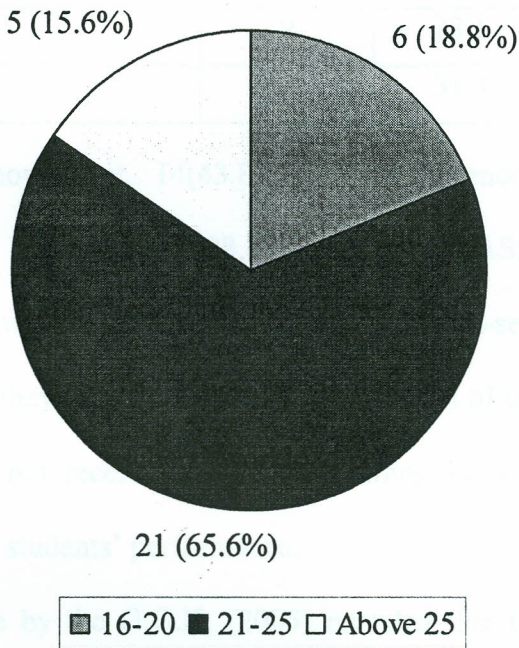


Figure 4.3: Workload/no. of lessons per week

Figure 4.3 indicated that 21 (65.6%) teachers had a workload of between 21-25 lessons per week, 6 (18.8%) had between 16-20 lessons while 5 (15.6%) had above 25 lessons per week. This shows that most of the teachers had heavy workloads. The more workload a teacher has, the less time they will pay to more important class activities. If a teacher is handling too many lessons per week no matter how motivated, he/she will be overworked. Most likely the teacher will not be in a position to prepare well. He/she may not even have time to organize for hands- on activities in the laboratory which require

pre-arrangement. Upon inquiry, all the 32 teachers who were sampled reported that they had attended SMASSE training. Table 4.9 shows the subjects trained in SMASSE.

Table 4.9 Subjects trained in SMASSE

N=32

Subjects	Yes		No	
	F	%	F	%
Chemistry	14	43.8	18	56.3
Biology	9	28.1	23	71.9
Physics	10	31.3	22	68.8

Table 4.9 shows that, 14(43.8%) teachers attended training in Chemistry subject, 10(31.3%) in Physics and 9(28.1%) attended SMASSE training in Biology subject. On being asked whether they had attended other in-service courses, 17(53.1%) teachers reported that they had attended while 15(46.9%) of them did not attend. Majority of the teachers had not received in-service training in science subjects, which may impact negatively on students' performance.

A study done by the G.O.K, (2005) revealed that the role of a teacher in learning is central. Apart from being conversant with the content he/she also needs to be able to deliver it appropriately by use of a variety of resources. and methodology which is improved regularly through attending SMASSE insets. The government thus should provide qualified teachers who are central to ensuring the provision of quality education in science.

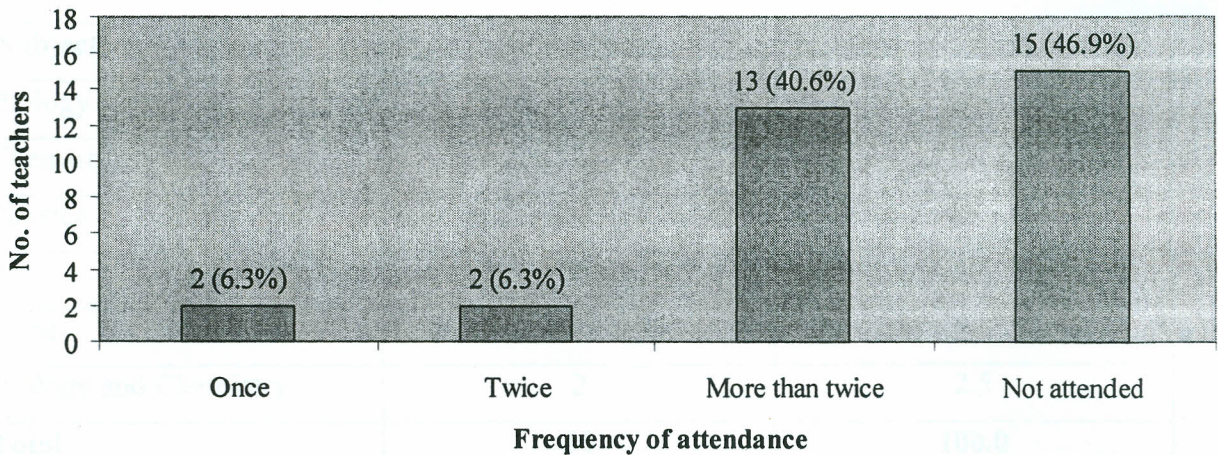


Figure 4.4 Times you've attended other in-service

Figure 4.4 shows that out of total respondents who attended other in-service, 13(40.6%) teachers had attended more than twice, 2(6.3%) attended once, another 2(6.3%) attended twice while those who did not attend were 15(46.9%).

This shows that teachers rarely attend refresher courses in the course of their teaching career.

4.5 Student related factors that hinder effective utilization of resources

The third objective of this study was to determine the student related factors that hinder effective utilization of resources in the learning of sciences in public secondary schools in Thika West.

To assess the attitude of students towards sciences, the students were asked to fill the table below: Table 4.10 shows the science subjects disliked by the students.

Table 4.10 Sciences subjects you dislike**N=80**

Subjects you dislike	Frequency	Percent
Biology	16	20.0
Chemistry	8	10.0
Physics	13	16.3
All	1	1.3
None	40	50.0
Biology and Chemistry	2	2.5
Total	80	100.0

Table 4.10 shows the subjects that students dislike or rather the ones they have bad attitude towards. Forty (50.0%) students do not dislike any of the science subjects, 16(20.0%) dislikes Biology, 13(16.3%) dislikes Physics, 8(10.0%) students dislikes chemistry, 2(2.5%) do not like both biology and Chemistry while 1(1.3%) dislikes all the science subjects. It has been noted that as shown in Table 4.15, most students did not like Biology yet it turns out in Table 4.16 that they perform better in it than in the other sciences. Most of the students who reported to have disliked any of the science subjects gave their reasons for disliking them as; involvement of calculations, boring, some despised their teachers and too many scientific words used in the subject. This shows that students had a negative attitude towards science subjects, which impacts negatively on their performance.

Recent studies have established that in the teaching of sciences, positive attitude is inculcated through involving learners in hands-on-activities in the laboratory (SMASSE, 2004). Learners get excited, happy and interested in the group activities as well as the lesson as a whole. This laboratory facilities and chemicals in every school ought to be

available and adequate. Performance in the sciences also determines the attitude. Poor performance cause negative attitude and vice versa.

To address the same objective, students were asked to state their agreement levels on a four-point likert scale related to the factors hindering effective utilization of resources. Their responses are shown in table 4.11.

Table 4.11: Student-related factors hindering effective use of resources N=80

Student-related factors	SA		A		D		SD	
	F	%	F	%	F	%	F	%
I handle all equipments with care	7	8.8	39	48.8	13	16.3	21	26.3
Even if I break an equipment I will pay for it	8	10.0	17	21.3	45	56.3	10	12.5
Science subjects are boring	12	15.0	32	40.0	20	25.0	18	22.5
During experiments, I take care not to cause any accidents	44	55.0	3	3.75	19	23.8	14	17.5
I take specimen from the labs for my own use instead of doing experiments	2	2.5	9	11.3	29	36.0	40	50.0
I misuse all the specimen in the lab	5	6.3	12	15.0	31	38.8	33	41.3
I participate in strikes when there are inadequate equipment in the lab	9	11.3	17	21.3	24	30.0	30	37.5
Experiments are too dangerous, I fear doing some of them	19	23.8	33	41.3	10	12.5	18	22.5
I am not interested in science subjects	22	27.5	14	17.5	27	33.8	17	21.3
Science subjects are too difficult	28	35.0	22	27.5	16	20.0	24	30.0
Broken equipments are frequently replaced with new ones	0	0.0	3	3.75	20	25.0	57	71.3

Table 4.11 shows that 48.8 % of the students agreed with the statements that: I handle all equipments with care, 40.0% said science subjects are boring, and 41.3 % said experiments are too dangerous, I fear doing some of them.25.0 % of the students however disagreed with the statements that broken equipments are frequently replaced with new ones, I misuse the entire specimen in the lab (38.8%), I take specimen from the labs for

my own use instead of doing experiments (36.0%). This implies that student-related factors shown in table 4.13 did not hinder the use of resources, since students had positive attitudes towards science subjects.

Attitudes are learnt and not innate thus they can be modified by experience and persuasion. Cockroft (1982) noted that there is no area of knowledge where a teacher has more influence over the attitude as well as the understanding of his pupils than in sciences. Table 4.12 shows the teachers' responses on student-related factors hindering effective use of resources.

Table 4.12: Student-related factors hindering effective use of resources (Teachers' responses) N=32

	SA		A		D		SD	
	F	%	F	%	F	%	F	%
Students aren't careful in handling lab equipment and chemicals.	9	28.1	12	37.5	7	21.9	4	12.5
Students misuse chemicals and specimen in the lab	11	34.4	13	40.6	5	15.6	3	9.4
Some students decide to do experiments without supervision, therefore making them hazardous.	8	32.0	14	43.8	9	28.1	1	3.1
Students do not take science subjects seriously	10	31.2	7	21.8	12	37.5	3	9.4
Students have a negative attitude towards experiments	16	50.0	10	31.3	4	12.5	2	6.3
Students steal equipment from the lab	8	25.0	8	25.0	6	18.8	10	31.3
Some students come from poor backgrounds and cannot afford some equipment to replace on breaking.	9	28.1	15	46.9	5	15.6	3	9.4
Students are undisciplined, therefore hard to control	2	6.3	5	15.6	18	56.3	7	21.9
The schools cannot afford expensive lab equipment for all the students	6	18.8	12	37.5	9	28.1	5	15.6

Table 4.12 shows that 37.5% of the respondents agreed with the statements that: students misuse chemicals and specimen in the lab, 31.1% agreed that students have a negative

attitude towards experiments and 43.8% agreed that some students decide to do experiments without supervision, therefore making them hazardous. On the other hand, 46.4% of them disagreed with the statements that: students do not take science subjects seriously and 50.1% disagreed that students steal equipments from the lab. This implies that the students hindered effective use of resources by misusing chemicals in the lab and also doing experiments without supervision. It also emerged that students had a negative attitude towards experiments, which may lead to their overall poor performance in sciences.

4.6 School-related factors that hinder effective utilization of resources

The fourth objective of this study was to determine the school-related factors that hinder effective utilization of resources in the learning-teaching of sciences in public secondary schools in Thika West District.

The teachers were to indicate the number of students in each class they teach to determine the class size. They were also asked some questions relating to school factors affecting utilization of resources in the learning/teaching of sciences.

Table 4.13 No. of students per class

N=32

Class size	Frequency	Percent
31-40	1	3.1
41-50	11	34.4
51-60	18	56.3
Above 60	2	6.3
Total	32	100.0

Table 4.13 indicates that there were 18(56.3%) teachers who taught a class of between 51-60 students, 11(34.4%) teachers taught between 41-50 students, 2(6.3%) had a class

size of above 60 students while 1(3.1%) had between 31-40 students. This shows that the classes were overcrowded, which may have an adverse effect in the learning of sciences. These sentiments are echoed by Brown, L. & Harde oadr (1969) & Witich & Schuller (1973) who observed that large class sizes have an adverse impact in teaching and learning of sciences. They also observed that increased student population work against effective resource usage because available resource may not be adequate. Nieuwenhuis F. J (2000) noted that many teachers who work in overcrowded classes have low morale and self esteem. Motivation suffers and classroom teaching methods are restricted to lecturing, thus students will lack the opportunity to discover on their own in hands-on activities with overcrowded classrooms.

The teachers were asked to describe the support of the teachers and the school administration towards science teachings in terms of provision of adequate resources. Most of them thought that the school administration was fair and the teachers work in teams to support each other.

Upon being asked to suggest other areas that require to be addressed by the school or otherwise those that hinder effective utilization of resources in their school, the teachers reported the following; Shortage of space and facilities, morale of teachers and students, no. of teachers to be increased and enrolment of students to be monitored. The teachers also reported they would like to see improvements in the utilization of resources in the teaching of science. Some improvements included; provision of adequate resources and lab technicians, addition of labs, motivate teachers and students to boost their morale, provision of textbooks and revision materials to students and reduce work load of

teachers to allow them more time with individual students. Table 4.14 shows the performance in science subjects by students

Table 4.14: Best performed subject

N=80

Best performed subject	Frequency	Percent
Biology	38	47.5
Chemistry	21	26.3
Physics	21	26.3
Total	80	100.0

Table 4.14 indicates that out of the 80 students sampled, 38(47.5%) perform best in Biology subject, 21(26.3%) students do well in Physics and another 21(26.3%) students perform best in Chemistry. Most of the students liked biology, implying that they related to the subject and therefore found it more interesting. It also implies that the biology teachers used appropriate teaching methods, thus enhancing student learning. Giving reasons as to why they perform best in the indicated subjects, the students indicated that: they were easy to understand/learn, they were career subjects, they were interesting, they love the subject and that the teacher was interesting. Despite the fact that learners liked Chemistry, they performed better in Biology than in Chemistry.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusions and recommendations arrived at. It also gives suggestions for further studies.

5.2 Summary of the research findings

The purpose of this study was to establish the barriers to effective utilization of resources in the teaching of sciences in secondary schools in Thika West District. The study participants comprised of 32 teachers and 80 students from eight schools in Thika West District. The data was therefore analyzed based on this number. Given below is a summary of the main study findings based on the four objectives.

5.2.1 The first objective sought to investigate the adequacy of available resources in the learning -teaching of sciences in public secondary schools in Thika West District.

The study established 78.1% of the teachers responded that, the most adequate resources were teachers' reference books. On the other hand, the most inadequate facilities were science teachers as resources (75.0%) laboratories (71.9%), teaching aids (68.8%), library books (68.8%), students' text books (65.6%) and laboratory chemicals (53.1%). However, 25% teachers reported that improvised apparatus were not available in their school. Another 5(15.6%) teachers also reported that library books were not available. This implies that most of the facilities were inadequate, which may adversely affect the teaching-learning process and finally the performance of students. It's also noted that Chemistry group work in class is the lowest, an indication that the subject is not taught

effectively. It was further observed that despite Physics being rated lowest in all categories of tables 4.7a and 4.7b, the performance in Physics reflected in table 1.1 is better than for Chemistry and Biology.

5.2.2 The second objective was to determine the teacher-related barriers that hinder effective utilization of resources in the teaching of sciences in public schools in Thika West District.

Regarding teacher-related factors affecting effective use of resources, a number of teachers agreed that; girls are equally capable of excel (71.9%), science should be optional in form 3 and 4 (53.1%), they believe their students can pass in science (65.6%) and science develop reasoning and it is stimulating (50.0%). However some teachers disagreed on statements like; sciences are easy subjects to teach (43.8%), they are responsible for their students' performance (56.3%), science concepts can't be understood (40.6%) and that sciences are difficult to teach (46.9%). This implies that teachers had a positive attitude towards science subjects, which they would likely impart on their students. Twenty one (65.6%) teachers had a workload of between 21-25 lessons per week. This shows that majority of the teachers had heavy workload implying that they had no adequate time to effectively prepare for ASEI/PDSI lessons.

The study revealed that majority of the teachers have not undergone SMASSE training or any other in-service courses in their teaching subjects. This implies that the teachers are not updated with the current teaching methodology and this disadvantage their students' performance in national exams.

5.2.3 To determine the student related barriers that hinder effective utilization of resources in the learning of sciences in public secondary schools in Thika West.

The study established that 48.8 % of the students agreed with the statements that: I handle all equipments with care, 40.0% said science subjects are boring, and 41.3 % said experiments are too dangerous, I fear doing some of them. 25.0 % of the students however disagreed with the statements that broken equipments are frequently replaced with new ones, I misuse the entire specimen in the lab (38.8%), I take specimen from the labs for my own use instead of doing experiments (36.0%). This implies that student-related factors shown in table 4.13 did not hinder the use of resources, since students had positive attitudes towards science subjects, however, majority of the students have a negative attitude towards use of science resources.

Overcrowded classes were established to be another barrier to resource utilization among students. Most classes had between 51 – 60 students. This number of students makes it impossible to carry out practical activities during science lessons.

Indiscipline among few students was also established to be another barrier to resource utilization. This was confirmed by teachers, who indicated that students misuse chemicals and specimen in the lab.

5.2.4 To determine school-related barriers that hinder effective utilization of resources in the learning-teaching of sciences in public secondary schools in Thika West District.

Some of the school-related barriers that hinder effective utilization of resources as reported by the teachers were: shortage of space and facilities, low morale of teachers and

students, inadequate teachers and over enrolment of students. The teachers also reported they would like to see improvements in the utilization of resources in the teaching of science. Some suggested improvements required included; provision of adequate resource and laboratory technicians, addition of laboratories, motivate teachers and students to boost their morale, provision of alternative textbooks and revision materials to students and reduce work load of teachers to allow them more time with individual students.

The subjects that students dislike or rather the ones they have bad attitude towards.

Forty (50.0%) students do not dislike any of the science subjects, 16(20.0%) dislikes Biology, 13(16.3%) dislikes Physics, 8(10.0%) students dislikes chemistry, 2(2.5%) do not like both biology and Chemistry while 1(1.3%) dislikes all the science subjects. Most of the students who reported to have disliked any of the science subjects gave their reasons for disliking them as; involvement of calculations, boring, some despised their teachers and too many scientific words used in the subject. This shows that students had a positive attitude towards science subjects, which impacts positively on their performance.

Out of

5.3 Conclusion

Based on the findings of the study as summarized above, it can be concluded that some students had a negative attitude towards science subjects. It emerged form the study that class text books were adequate in most schools, as two students shared a textbook but other textbooks for further work were not available. The study established that teachers supported students appropriately in science subjects despite the fact that most of them had not received training in SMASSE. However, teachers did not involve students more in class activities while teaching which is against SMASSE recommendations in the

ASEI/PDSI approach of teaching science. Also teachers did not allow students to evaluate the lessons taught. The study revealed that other areas that require to be addressed by the school or otherwise those that hinder effective utilization of resources in schools were; Shortage of space and facilities, low morale of teachers and students, Shortage of science teachers, high enrolment of students and unqualified laboratory assistants in the laboratory .

5.4 Recommendations

1. Schools, parents and the community at large should join hands and ensure that schools have adequate resources for science subjects, especially laboratory equipment.
2. School heads should motivate teachers by ensuring they are provided with the teaching/learning resources needed for science subjects.
3. The TSC should employ enough science teachers and ensure they are distributed to schools as per the number of students. This will ensure that teachers are not overworked, leading to better performance in sciences by students in the long run.
4. Students should be motivated to have a positive attitude towards science subjects by making learning interesting and rewarding those who perform well. Those who lag behind should also be encouraged to work harder.
5. Teachers should identify areas where students have problems and focus on that. They should also ensure that the syllabus is covered in good time to give students ample time for revision.

5.5 Areas for Further Research

1. A study should be conducted on leadership role in the effective utilization of resources in schools.
2. Since this study was conducted to find out the barriers to effective utilization of resources in the teaching of science subjects in secondary schools, a similar study could be conducted on other subjects.
3. A study to be conducted to find out why in Thika West the performance in Physics among the sciences is the best and yet conventionally the subject is not popular among the students and it is poorly performed generally.

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Existing problem is encountered in the resource utilization in the working of response in school at Thika District and in the country at large.

You are therefore kindly requested to:

- Give as much honest responses as possible-

- Do not write your name or the name of your school.

Tick against your gender or fill in the blank

Q1. Gender: Male [] Female []

Q2. Indicate the type of your school.

Nationality [] Province [] District []

Q3. Age: Below 30 yrs [] 30-40 yrs [] 40-50 yrs [] Above 50 []

What is your Academic Qualification?

KCT Certificate []

[]

[]

[]

[]

Other Qualification []

APPENDICES

APPENDIX I

TEACHER QUESTIONNAIRE

Introduction

This questionnaire seeks to gather information to be used in a study of barriers to effective utilization of resources in the teaching of sciences in secondary schools in Thika West District

teaching problems encountered in the resource utilization in the teaching of sciences in a school in Thika District and in the country at large.

You are therefore kindly requested to;

- Give as much honest responses as possible.
- Do not write your name or the name of your school.

- Information given will be treated with a lot of confidentiality.

Tick against your option or fill in the blacks.

- Q1. Gender: Male [] Female []
- Q2. Indicate the type of your school.
Nationality [] Province [] District []
- Q3. Age: Below 30 yrs [] 30-40 yrs [] 40-50 yrs [] Above 50 yrs []
- Q4. What is your Academic Qualification?
KCSE/ KCE Certificate. []
KACE []
Diploma. []
Degree []
Masters []
- Q5. What is your Professional Qualification?
S I [] Diploma in Education []
P G D E [] UT Graduate []

Tick as Appropriate

	Facilities / Resources	Adequate	Inadequate	Not available
A	Staff (lab technicians)			
B	Science teachers			
C	Classroom			
D	Laboratories			
E	Teacher's reference book			
F	Teacher's Guide books			
G	Student's text books			
H	Library books			
I	Laboratory apparatus/ Equipments			
J	Lab chemicals			
k	Improvised apparatus			
l	Teaching aids:			

Q15. Please put a tick which best indicate how you agree or disagree with the following statements. Strongly disagree (SD), Disagree (D), Undecided (U) Agree (A) strongly Agree (SA).

	Statement	SD	D	U	A	SA
A	Sciences are easy subjects to teach					
B	Girls are equally capable of Excelling in Science					
C	Science should be optional in Form 3&4					
D	I believe my students can pass in Science					
E	I am responsible for my student's performance					
F	Science concepts cannot be understood without conventional apparatus					
G	Sciences are difficult to teach					

H	Sciences develop reasoning and are stimulating					
---	--	--	--	--	--	--

Q16. In your opinion how can you best describe the support of the school administration towards science teachings in terms of provision of resources?

Q17. How can you best describe the support of other teachers in your school towards the teaching of science?

Q18. Suggest other areas that require to be addressed by your school or otherwise that hinder effective utilization of resources in your School.

Q19. Which improvements would you want to see in future in the utilization of resources in the teaching of science?

Q20. Please put a tick which best indicate how you agree or disagree with the following statements. Strongly disagree (SD), Disagree (D), Undecided (U) Agree (A) strongly Agree (SA).

	SA	A	D	SD
Students aren't careful in handling lab equipment and chemicals.				
Students misuse chemicals and specimen in the lab				
Some students decide to do experiments without supervision, therefore making them hazardous.				
Students do not take science subjects seriously				
Students have a negative attitude towards experiments				
Students steal equipment from the lab				

THANK YOU FOR YOUR PARTICIPATION

APPENDIX II

STUDENTS' QUESTIONNAIRE

Introduction

This is a research project into the Barriers hindering effective utilization of resources in the Teaching / Learning of sciences in Secondary Schools in Thika West District. The honest response you give will go along way in improving the teaching of Sciences and particularly in the utilization of resources in Sciences.

NB: - Please be frank and honest as you respond to the questions below.

- Do not write your name / name of your School anywhere.
- Anything you write will be treated with a lot of confidence .So do not fear

writing what

You have to say.

- Please tick [] appropriately

1a) .Sex: Male [] Female []

b.) Age: between 15-20 yrs. Above 20 yrs []

c). Class /Form. Form 2 [] Form 3 []

KCPE mark obtained.

Below 200 [] 201-300 [] 301-399 [] Above 400 []

2. Type of School

a). Boys only [] Girls only [] Mixed boys & Girls []

b). Day [] Boarding [] Day & Boarding []

c) In the last three years the school has gone on strike

Yes [] No []

d) I always clear my school fees at the beginning of the term.

Always [] rarely [] never []

4. Our teacher is always ready and willing to answer questions asked by the learners in;					
(b)Biology					
(c)Chemistry					
(d)Physics					
5.Our teacher is always punctual in attending the lesson in;					
(a) Biology					
(b) Chemistry					
(c) Physics					
6. We are able to complete the syllabus on time in;					
(a) Biology					
(b) Chemistry					
(c) Physics					
7. Five or more of us share apparatus while performing experiments/activities in'					
(a) Biology					
(b)Chemistry					
(c) Physics					
8. During experiments apparatus are enough for activities in;					
(a) Biology					
(b)Chemistry					
(c) Physics					
9. We are tested after every topic in;					
(a) Biology					
(b)Chemistry					
(c) Physics					
10. We are involved in collecting practical learning materials in;					
(a) Biology					
(b)Chemistry					
(e) Physics					
11. Our teacher marks our note books and assignments in					
(a) Biology					
(b)Chemistry					
© Physics					
12. We always carry out practical					

Read the statement in the table below and respond appropriately by ticking in any of the four spaces. NB/ You can only tick once against each statement.

	SA	A	D	SD
I handle all equipments with care				
Even if I break an equipment I will pay for it				
Science subjects are boring				
During experiments, I take care not to cause any accidents				
I take specimen from the labs for my own use instead of doing experiments				
I misuse all the specimen in the lab				
I participate in strikes when there are inadequate equipment in the lab				
Experiments are too dangerous, I fear doing some of them				
I am not interested in science subjects				
Science subjects are too difficult				
Broken equipments are frequently replaced with new ones				

THANK YOU FOR YOUR PARTICIPATION

APPENDIX III

OBSERVATION GUIDE ON PHYSICAL FACILITIES

A. BACK GROUND INFORMATION

1. Category of school (tick all that apply)

- i) National [] Provincial [] District []
- ii) Boys [] Girls [] Mixed boys and girls []
- iii) Day [] Boarding []
- iv) Special [] Integrated []

2. Observation of facilities and equipment (Tick as appropriate)

Facility/personnel	Available		Adequate		Condition/state usability			Remarks
	Yes	No	Yes	No	Good	Fair	Poor	
Classrooms								
Laboratories								
Piped gas system(in the lab)								
Lab equip And materials								
Chemicals								
Glassware								
Other								
permanent Apparatus								
Preserved specimen								
Chemicals & apparatus room								
Teachers preparation room/space								
Lab technician								
Science course books								

Facility/personnel	Available		Adequate		Condition / State usability			Remarks
	YES	No	Yes	No				
Reference materials								
Safety measures								
Ventilation								

*1. Comment on class size in relation to number of learners

*2. Comment on laboratory size in relation to number of learners

*3. Comment on usage of the laboratory

Appendix IV
Research Permit (i)

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCE TECH", Nairobi
Telephones: 254-020-241349, 2213102
254-020-316571, 2213123
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref:

NCST/RRY/12/1/SS-011/316/5

Date:

21st March 2011

Wanderi Mary Nyakiringa
Kenya University
P. O. Box 43844
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "Examination of barriers to effective utilization of resources in the teaching/learning of sciences in secondary schools in Thika District" I am pleased to inform you that you have been authorized to undertake research in Thika District for a period ending 31st December 2011.

You are advised to report to the District Commissioner and the District Education Officer, Thika District before embarking on the research project.

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

P. N. NYAKUNDI
FOR: SECRETARY/CEO

The District Commissioner
Thika District

The District Education Officer
Thika District

Research Permit (ii)

MINISTRY OF EDUCATION

Telephone (067) 31398 / 31272 (D.L)

FAX: (067) 31272

When Replying please quote



DISTRICT EDUCATION OFFICE

THIKA WEST DISTRICT

P.O. BOX 262,

THIKA.

Ref: TKH/ADM/234/VOL.1/78

: 24th March 2011

All Principals
Secondary Schools
Thika West District

REF: COLLECTION OF DATA FOR RESEARCH – MARY N. WANDERI

The above mentioned is a student doing Masters Education Degree in Resource utilization in the teaching of sciences in our secondary schools in Kenyatta University.

This office has authorized her to collect data on the same from Thika West district schools.

Please accord her the necessary assistance.

A handwritten signature in black ink, appearing to read 'NJARAMBA J N'.

NJARAMBA J N
FOR: DISTRICT EDUCATION OFFICER
THIKA WEST