

THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Influence of Instructional Resources on Learning Science Activity among Pre-School Children in Langata Division, Nairobi County, Kenya

Dr. Stephen Kyalo Mutiso

Lecturer, School of Education, University of Nairobi, Kenya

Abstract:

The preschool stage is a significant stage in a child's development. It provides a child with fundamental knowledge that paves way for realization of a future education and career pathway in life. For this objective to be achieved there's reason for preschools to provide adequate instructional resources to the teachers to improve their work and thus improve the learning outcomes of the pupils. Instructional resources therefore are very key in learning science activities; science mainly deals with nature exploration, experimentation and use of senses to learn about the World. The success of any science program largely depends upon the quantity and quality of the materials that can be utilized. Proper use of appropriate resources and learning strategies enhance acquisition of the subject matter. A preschool teacher has to synchronize the methodologies of teaching with the teaching resources at hand to ensure learning is holistic, integrated, simulative and enjoyable. The research project sought to examine the influence of instructional resources in learning science among preschoolers. A key limitation of the study was that, some private schools were suspicious of the intention for the study and therefore did not co-operate fully in data collection therefore the study engaged only two schools. The population of the research comprised of participants of 3-6 years age bracket. The research design of the study was correlation and ex-post facto research design. The research tools used include observation, structured questionnaires and interview schedule. Data analysis valued all information qualitatively, whereby all information collected was considered as an integral research process. The key finding in this study was parents' contribution and involvement in the provision of instruction materials has not been dealt with fully due to lack of knowledge to many parents on how science should be taught and the poverty life has also affected the availability of materials in the school. Therefore there's need to sensitize and mobilize the parents on importance of instructional materials for better learning on science activities.

Keywords: *Instructional resources, science activity, preschool, children's learning*

1. Introduction

1.1. Background of the Study

Globally, education is a fundamental human right (United Nations Convention for Rights of Children, UNCRC, 2000). Unprecedented attention has been focused on literacy among children (Early Childhood Technical Assistance Center, ECTAC, 2012). Jomte in World Conference on Education for all (EFA) and Dakar Conferences (2000) under scored the importance of instructional resources in ECE for the purposes of improving children's learning. Globally, a preschool is a learning institution similar to the child's home environment, where a child grows and develops. It has the responsibility of offering introductory learning activities towards primary school education. The environment plays a critical role, the richer the environment the more concrete opportunities there are for children to learn by interacting with instructional resources. Omaiyo, 2013 suggested that good instructional resources stimulates ideas and demand active response from the children. In accordance to Kate's (2006) report, learners must be provided with different types of instructional materials to improve learning, this enables them to recognize different colors, texture, shape and size. Kate (2006) further stated that learning of science vocabulary and the ability to observe and discover new ideas through performing various experiment in science activity involve the children engaging with the instructional materials.

Effective teaching and learning does not only depend on children's cognitive abilities but also the learning environment. Learning environment includes availability and effective use of sufficient activities and institution resources organized in science activity corner of the classroom in an attractive manner. The fundamental elements of quality preschool teaching and learning practice include well organized and managed learning environments, responsive social and emotional support, and use of curricula materials and meaningful instructional interactions to facilitate children's thinking and skill development (Omaiyo, 2013).

The government of Kenya has invested a lot of money in training preschool teachers in order to acquaint them with the required knowledge in undertaking this noble duty of teaching Early Childhood Education, and also the government has also formulated and developed curriculum acceptable to all members of the society, District Center of

Early Childhood Education (DICECE), Kenya Institute of Education (KIE) and National Center of Early Childhood Education (NACECE, 2001).

Early childhood science education plays a role in pupil's future educational life Macharia M.B (2000). Children in preschool learn science through their senses consequently, materials to be touched, felt, smelt, tasted and seen should be provided to allow exploration and discovery. The handbook for ECDE syllabus KIE (2006) points out that children performance in this level is generally determined by the kind of the instructional resources exposed to them while learning. This influences other levels of formal education and career pathways. Today many classes lack basic interactive teaching science activities and learning materials. If those were available teachers could transform their classroom into stimulating environment to maximize the learning potential of preschool children in participating in science activities. This could enhance their love of learning science activities and lead to greater levels of retention in school and performance in examination.

The Ministry of Education (MoE) and United Nations International Children's Educational Fund (UNICEF) (2002), launched the child centered interactive approach to teach and learn science activities aimed at improving the quality of teaching and learning in and out of classrooms environment by motivating and empowering teachers and the learners. Stimulating science classrooms gives guidelines on how to relate the child's prior knowledge or entry behavior towards intended concept acquisition and appropriate application to scientific task. Therefore, the school should agree on the need to produce a manual that could help the teachers to make a large variety of the child's instructional resources and use them effectively in preschool learning programs. The prescribed materials should be produced at low cost. The science content should be flexible, creative, imaginative and adoptive to the learner's level of understanding.

In Kenya, there's scarcity of knowledge on how instructional resources influence preschoolers performance in science activities. No such study has been undertaken and documented. The reason could be attributed to negligence by preschool teachers to device and innovate science oriented instructional resources. Therefore there is a need to carry out the study on the influence of instructional resources on learning science activity among preschool children.

1.1.1. Relationship between the Use of Instructional Materials and Performance of Science

There are many studies that explored the relationship between instructional materials and other related inputs and children's learning performance. Science instructional materials or resources are used by learners and teachers to complete hands-on activities, reading, listening or writing activities presented in science lessons. Exposure to various science instructional materials and science activities helps learners to learn and to remember what they learn and this make their learning to be more enjoyable.

The availability of instructional resources has a positive effect on science performance. The use of this materials or resources enhances concentration, classroom control and early identification of learners with special needs due to their inability to manipulate the provided materials, by this science activities performance is enhanced. A study by Kibe (2011) stated that there is a good relationship between effective teachings and use of instructional materials. Kibe (2011) argued that while some educators have been fascinated by the potential of instructional materials to enhance teaching and learning, teachers lagged behind in using instructional materials during teaching and learning. Instructional materials are integral components of teaching science in learning situations. It then shows that, for effective teaching of science, utilization of instructional materials is necessary, thus the research explored how use of resources affects preschool children's performance in science activity.

In accordance to Mwangi report (2009), adequate manipulative (concrete) resources and models assume a critical role in helping children learn science throughout their preschool education. Teachers should use different models when teaching a particular concept. Children should be exposed to adequate instructional resources since they acquire knowledge by constructing it through their interactions with the environment to explore the environment. Children use concrete resources such as toys, stones among others. When children are learning classification, they use concrete materials/objects such as sticks, stones, leaves and they are not able to make mental representations of the skills and concepts learnt during classification without concrete materials.

Omayo (2013), reported that providing opportunities and materials for children to classify, sort and group objects using various criteria like; color, shape, size, texture or use, help children to symbolize and use differed imitation and enhance their mental abilities. Omaiyo (2013), asserted that learners actively construct their knowledge depending on the type of resources used; see, hear or do in relation to what they knows thus, children should be exposed to different types of resources so that they can construct their knowledge better.

Oginni; Awobodu; Alaka and Saibu (2013) noted that availability and adequacy of instructional resources in learning science improves children achievement because every learner is involved in the activity given. Adequate instructional resources enable learners to acquire science skills. As they interact with instructional resources, they learn classification skills which help them in matching, modeling and sorting among others. All this learning is done in a safe environment where the parents should provide instructional resources and coordinate with pre-school teachers so that the environment can enable children learn by doing, manipulating, observing, exploring and experiment with a variety of instructional resources guided by the teacher (MoE,2008).

The ECE curriculum developed by Kenya Institute of Curriculum Development (KICD) has provision for children to have adequate instructional resources to interact with but most children in ECD however do not interact with a variety of instructional resources. This is because most ECD teachers do not care and teach science without adequate resources, hence learners fail to develop some science concepts. Most ECD centers in Kenya give little or no time for children to interact freely with instructional resources during science lessons (Waithaka, 2005). Librera, Bryant, Gantwerk and Tkach

(2004) stated that the environment as well as the resources used by pre-school children is essential to their development. The pre-school classroom environment must provide welcoming, safe, warm and stimulating areas to promote the development of the whole child expand and deepen learning.

1.1.2. Parents' Ability to Provide Instructional Resources for Science Activity

Globally, there's a notable consensus across education policy statements and practice guidelines in many countries that parents are children's first and most enduring educators (OECD, 2012). Indian Green Building Council (IGBC, 2008) stated that the council recognizes that a student's education is a responsibility shared by the government, parents, families and other members of the community during the entire time a student attends school. Harvard Family Research Project (HFRP, 2006) believes that children must have a range of learning environments around them or complementary learning which includes family, early childhood programs, schools, out-of-school time programs and activities, libraries, museums and other community based institutions.

According to Kamerman (2000) report, children, mothers, fathers, and practitioners all have a role to play in early learning. Attention needs to be paid to parents-child relationships, practitioner-child relationships, child-child relationships and parents-practitioners relationships. It is recognized that parents and practitioners may need support to make these learning partnerships work. Families dealing with stressful circumstances such as poverty, unemployment, family breakdown or addiction need particular support. There have been a number of initiatives like printed and online guidelines, and handbooks, in-service workshops, film material and online discussion to support Early Childhood Education and Care (ECEC) services and schools to enhance parental involvement, to develop conditions for and improve learning partnerships between parents and ECEC services and schools. Despite these initiatives, some academic researchers speak about worsening relations and little meaningful performance between parents and schools, to the detriment of children.

In accordance to Wanke (2008) report, parents tutoring bring considerable improvements to children. Socio-economic status has been recognized as an influential factor concerning parental involvement. Children require families that can provide literacy with environments that foster readers in the school and if parents are not literate, they cannot assist their children with school work at home. The benefits of parents' ability to provide instructional resources include the elimination of mistaken assumptions which parents and school administration may hold about one another motives, attitudes, intentions and abilities.

1.2. Statement of the Problem

Instructional resources are key in learning science activity in a formal classroom setting. Science is all about nature, exploration, experimentation and use of senses to tell about the world. If no enough and appropriate resources are provided to children to learn these skills, there will be no hands on learning and manipulation of objects among the pre-schoolers. Teachers fear taking children out to learn about nature basically because most of the school's administration would not allow them to, relatively much time is needed to prepare the resources which in most cases are hardly available. This therefore presented the research gap that the study sought to link and document.

1.3. Research Objectives

- To establish the instructional resources influencing children's learning in science activity.
- To establish how parent's ability to provide instructional resources influence children's learning in science activity.

1.4. Theoretical Framework

This study used the cognitive development theory proposed by Piaget (2009) and Bruner (2001). According to these scholars, the cognition of a child is developed during early age of two to seven years. During that period of time, they use senses to comprehend the outer world. Therefore, teachers should provide them with physical materials to explore, handle, touch, smell, and to see. The younger the age the more practical objects will be needed for their learning. Alternative models, graphics or pictures and symbols can be used gradually when their experiences become more abundant. It is important that children to be guided and assisted by parents, teachers or people who are experienced with teaching aids when they are handling and exploring with toys or teaching aids. Alsop (2004) asserts that students being taught using constructivist science methods would become active learners in their environment, develop cognitive thinking and be able to relate science on real world application. The purpose of knowing is to adapt to the environment and the learner must be active, not a vessel to be filled with knowledge. In accordance to Mee (2006) report, he stated that the implication of constructivism is not to think that the learner's mind is blank, therefore learning should build on what the learners knows and also that time is needed for a constructivist mind to be created. Prior knowledge influences the new knowledge and learners will construct from new learning experiences.

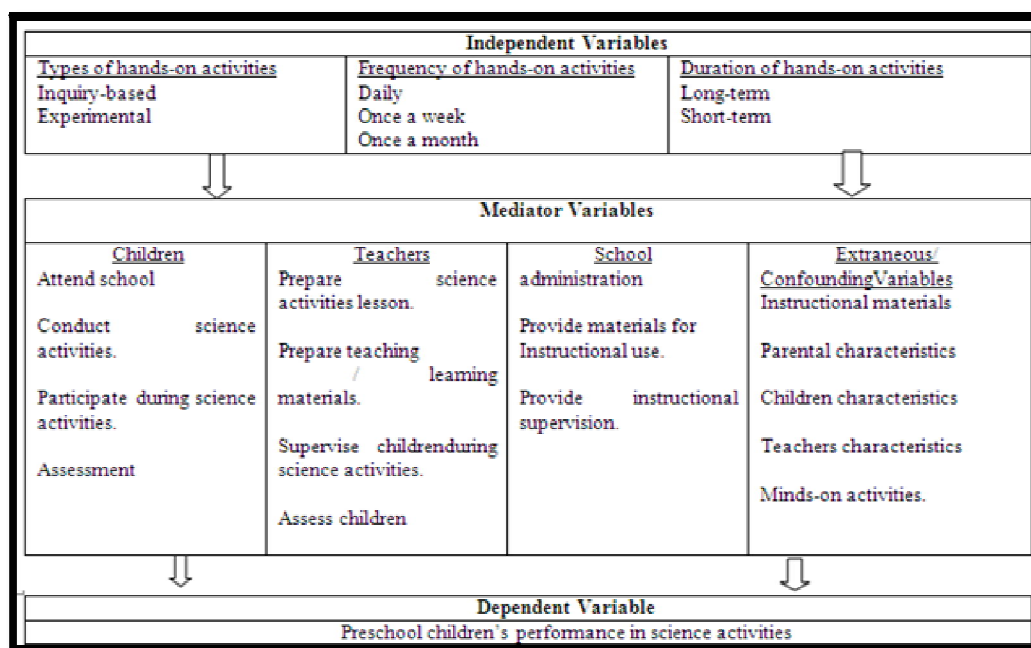


Figure 1: Conceptual Framework

1.5. Conceptual Framework

From Figure 1, the three independent variables which are the type, frequency and duration of hands on activities together with the extraneous variables influence the performance of preschool children in science activities. The children attend school, conduct hands on activities and participate during science activities assessment. The teachers prepare science activities lesson, prepare teaching learning materials, supervise children during science activities and assess children. The school administration provides the facilities that are used during the teaching, learning process and also supervise the mode of instruction used by the teachers. The extraneous variables which are the instructional materials, parental characteristics, children characteristics, teacher characteristics and mind -on activities also influence the performance of preschool children in science activities but the researcher will only focus on the influence of the independent variables.

2. Methodology

2.1. Research Design

This study used correlation and ex-post facto research design. The research design enabled the researcher to establish the relationship among the dependent variables (instructional resources) that influence the results of independent variables (the science activities). This kind of research allowed the researcher to establish the impact of independent variables (science activities) on the dependent variables (instructional resources) when the learners were doing activities and answering questions from the teacher.

2.2. Target Population

Population is the sum total of all that conforms to a given specification or it can also be an entire group of individuals, events or objects having common characteristics. Therefore, the population of the research comprised of the participants of 3-6 years. The study's target population was five preschools, twenty preschool teachers and hundred preschool children drawn from Langata division, Nairobi County.

2.3. Sampling Procedure and Sample Size

From the five preschools in the zone, two schools were selected to participate in the research. The research employed the purposive sampling technique whereby participants were picked based on the research objectives and the researcher's judgment. Purposive sampling was also used because all the learners and teachers were included in the study. Random sampling technique was also used to ensure that all population stands equal chance of being selected. Sample size in this study included two preschools (private schools), preschool teachers (five men and ten women) and also preschool children (thirty boys and twenty girls). Sampling gave the researcher opportunity to access the validity of instructional resources among the learners.

Category	Gender	Total Population	Sample Size	Percentage (%) of Sample
Private schools		5		23.0
Teachers	Men	5	5	7.5
	Women	10	10	14.9
Children	Boys	70	30	44.8
	Girls	50	20	29.9

Table 1: Sample Size

2.4. Research Instruments

The instruments used in this study include observation, questionnaires, interview schedule, and documentary materials. These instruments were used to collect data relevant to the objectives of the study.

Observation; the researcher assessed the scene of action with the research objectives. The researcher was directed by his plan of action already prepared in advance to collect the data systematically from the direct observations without inferring with proceeding of teaching and learning process. The researcher recorded the proceedings while the learners were doing the learning activities such as modeling, coloring, drawing and socializing.

Structured questionnaires; the questionnaires were addressed to the subject teacher in order to obtain information in regard to selection of instructional resources and validity of their content toward achieving the intended objectives. The researcher employed open-ended and close – ended questions.

Interview schedule; it was used to collect data from the parents of the preschoolers on their view on how preschool science teaching was conducted in their children's schools.

Documentary records; Professionals records were analyzed in order to help the researcher to familiarize himself with classroom proceedings, methods of teaching and the intended behavior changes.

The researcher administered a questionnaire to the preschool teachers who responded to the questions that had been asked relevant to the researcher questions or research objectives. This included how science activities were carried out at the preschools. An interview schedule was administered to the parents of the preschoolers together with data based on how children's science activities were represented on their workbooks; whether they had science activities regularly or not and what they were taught in relation to preschool science activities. The researcher recorded her findings in accordance with planned schedule before analyzing.

3. Data Analysis and Discussion

When analyzing the data, the researcher valued all information qualitatively. That is, all the information collected was considered as an integral research process. The information validity was regarded as a way forward in achieving the findings. Therefore, the process of collecting data in learning situation determined the success of the research process and the results generalized inductively and deductively. By doing so, the researcher made the competence of the response and accuracy.

3.1. Instructional Resources Used by Preschool Teacher

The researcher conducted an observation schedule on various types of instructional resources used in both two preschools and the responses are in Table 2

Preschool Name	Concrete (%)	Visual (%)	Audio (%)	Audiovisual (%)
School A	80%	75%	20%	10%
School B	78%	68%	10%	3%
Mean	79%	72%	15%	7%

Table 2: Instructional Resources Used by Preschool Teacher

From the findings, all the two preschools have concrete materials with a mean of 79%, visual materials with a mean of 72%, audio materials with a mean of 15% and audiovisual with a mean of 7%. This shows that preschools have different types of instructional resources. This agrees with Piaget who indicated that different age groups requires different materials and the same happens for different content areas and therefore Piaget divided materials for ECDE science into four categories namely concrete materials (materials that can be manipulated for example, dolls, beads, a toy car, fruits among others), Visual materials (materials that need the sense of sight only like flash card, cut-outs charts, picture books, picture cutting, magazines among others), Audio materials (materials that produce sound and pictures like Television, Films and DVD's) and Audio-visual materials(materials that produce sound like Radio, Radio Cassettes, CDS, Walkman and iPod.

The study further showed that instructional materials are used during science work lessons. This information collaborates with findings by Mwangi (2009) who reported that adequate manipulative (concrete) resources and models help children learn science work throughout their preschool education. This further collaborates study by Omaiyo (2013) who asserted that learners actively construct their knowledge depending on the type of resources used; they see, hear or do in relation to what they know, learners to be exposed to different types of resources so that they can construct their knowledge better.

3.1.1. Teacher Experience on Use of Instructional Resources

This section presents information concerning the educational level of the preschool teachers and their years of experience in teaching. The respondents were asked to indicate their education level, teaching experience and refresher courses attended. Responses are shown in Table 3, 3.4 and 3.5.

Education Level	Frequency	Percentage
Certificate	5	33.3
Diploma	10	66.7
Total	15	100.0

Table 3: Education Level of the Respondents

The findings show that 33.3% of the respondents have certificate level of education while 66.7% have diploma level of education. Trained preschool teachers had the required skills pertaining to use of instructional resources in science lessons. This agrees with Libera; Bryant; Gantwerk and Tkach (2004) who indicated that a qualified teacher create a stimulating and safe environment as well as putting resources he/she feels are most beneficial to the child to learn how to identify and classify in classroom. The study further agreed with the Ministry of Education (2009) who reported that preschool teachers should have knowledge of planning, organization and management skills. The teacher should have the ability to mobilize children in carrying out science activities using various instructional resources.

Number of Years in Preschool Teaching	Frequency	Percentage
3-6	6	40
6-10	9	60
Total	15	100.0

Table 4: Number of years in preschool teaching

From the findings, majority of the respondents (60%) have taught in preschool for 6-10 years. Teaching experience assist the preschool teachers to be conversant with the problems encountered during learners' participation in science lesson. The past experience enables teachers to get solution to the current problem. This agrees with National Coalition fore Core Arts Standards (2012) which observed that experienced teachers provide support and use appropriate teaching strategies and instructional resources which enable children participate in science activity.

Refresher Course	Frequency	Percentage
Kenya Institute of Education	5	33.33
Mountain Top Publishers course on ECDE	2	13.33
ECDE Capacity building workshop at Olympic TTC	8	53.33
Total	15	100.0

Table 5: Refresher Courses Attended by Preschool Teachers

The study indicated that majority of the respondents (53.3%) attended refresher courses on ECDE capacity buildings workshops at Olympic Teachers Training College (OTTC). KICD enhances knowledge to preschool teachers on how to interpret curriculums in ECDE. Mountain Top Publishers enlightens preschool teachers on thematic approach which assist children to understand science work concept better. Refresher courses inform the preschool teachers of the new developments in teaching science to preschoolers. This agrees with Waithaka (2008) who stated that preschool teachers are trained so that they can enable children interact with instructional materials. This further agrees with Omaiyo (2013) who reported that learning can only take place in the presence of the qualified teacher who is able to handle and organize instructional resources for science activity.

3.2. Parents Ability to Provide Instructional Resources

This section sought to establish how parents are involved in provision of instructional resources for science activity, parents who attend school meetings regularly and those who pay school fees regularly to enable acquiring of instructional resources. The responses are shown in Tables 3.6, and 3.7.

Parents Involvement	Frequency	Percentage
Parents are involved in collecting of instructional resources e.g. toys, bottle tops	2	13.3
Invite parents in workshop of making instructional resources	7	46.7
By setting a material making day in the preschool	3	20
By encouraging and helping children to use instructional resources in science activity	3	20
Total	15	100

Table 6: Parents Involvement in the Provision of Instructional Resources

From the findings, 46.7% of preschool teachers indicated that parents should be involved through workshops of making instructional resources, 20% of preschool teachers indicated that they should be involved through setting of instructional resources making day in the preschool while 20% believed that parents should be encouraged to help their children in using instructional resources available at home (20%). This agrees with Kamerman (2000) who reported that children, mothers, fathers and practitioners all have role to play in early learning and attention needs to be paid to parent-child relationships, practitioner-child relationships, child-child relationships and parent-practitioner relationship for them to make learning partnerships work. This is further supported by OECD (2012) who stated that there is a consensus across education policy statements and practice guidelines in many countries that parents are children's first and most enduring educators.

Sources of finances	Frequency	Percentage
School management	4	26.7
Fundraising in schools	2	13.3
Parents contribution	3	20
From parents and school management	6	40
Total	15	100

Table 7: Sources of Finances for Purchase of Instructional Resources

The study findings show that funds for purchase of instructional resources come from parents and school management as indicated by 40% of the respondents. This agrees with study by Kamerman (2000) who stated that there is public and private funding for acquisition of instructional resources. The findings also indicated that less than 30% of the finances received from parents go to purchasing of instructional resources. Adequate funds enable preschool teachers to purchase a variety of instructional resources on time. Availability of funds enables teachers and management to attend workshops meant to improve the use of instructional resources. This agrees with Karimi (2012) who indicated that parents who provide building, teaching and learning materials have made successful and quality training in preschools.

4. Conclusion and Recommendations

4.1. Conclusions

4.1.1. Instructional Resources Used by Preschool Teachers

From the findings, all the two private schools have concrete materials with a mean of 79%, visual materials with a mean of 72%, audio materials with a mean of 15% and audio visual materials with a mean of 7%. These show that relevant instructional materials are used during science activity. The study findings indicated that all the two preschool teachers use more of the concrete and visual materials compared to audio materials and audio visual materials. This could be because concrete and visuals are readily available, easy to improvise and children can manipulate them and thus easy to remember. From the findings, 79% and 72% considered concrete and visual materials as the best respectively. It can be concluded that different types of instructional resources influence children's learning in science work. Concrete and visual instructional resources are widely used in preschools. Preschool learners should be exposed to different types of resources so that they can construct their knowledge and thus improve their performance in science work. Preschool teachers' experience in using instructional resources influence children's learning in science, therefore preschool teachers should be trained and be experienced in using instructional resources in science lessons to improve preschool children's learning in science work.

Trained preschool teachers have the required skills pertaining to use of instructional resources in science activity. From the findings, 60% of the preschool teachers have taught in preschool for 6-10 years. Teaching experience assist the preschool teachers to be conversant with the problems encountered during learners' participation in science activity. The past experience enables teachers to get solution for the current problem. The study shows that, 53.3% of the respondents attended refresher courses on ECDE capacity building workshops at Olympic Teachers Training College (OTTC). Refresher courses inform the preschool teachers of the new developments in teaching preschools.

Instructional materials are very important especially for preschoolers since they stimulate the child and mentally prepare him/her for the steady routine of formal schooling. Children must be made to learn essentials things for their all around survival, for example acquisition of the basic skills necessary for higher intellectual development. Therefore teachers should use teaching/ learning materials and discourage memorization without understanding. The teachers should also encourage learning by experience and experimentation. In addition they should teach children new knowledge by associating it with what is already familiar to the children. The school system should do all it can with what it has to enhance proper early stimulation in young children and this can be done through the use of teaching and learning materials.

4.1.2. Parents Ability to Provide Instructional Resources

From the findings, 46.7% of preschool teachers indicated that parents should be involved through workshops of making instructional resources, 20% of preschool teachers indicated that they should be involved through setting of instructional resources making day in the preschool while 20% believed that parents should be encouraged to help their children in using instructional resources available at home (20%).

Parents' ability to provide instructional resources do influence children's learning in science work, therefore the parents should be involved in school meetings which decide on the instructional resources to be purchased or improvised. The parents should also pay fees promptly to enable preschools acquire instructional resources for use in science work and thus improve children learning in science work. Parents should also help their children in using instructional resources available at home for science work. Availability of finances for provision of instructional resources influences children's learning in science work. Finances provided to preschools from public and private sources enable preschools acquire appropriate instructional resources for use in effective teaching and learning of science work and thus improving children's performance.

4.2. Recommendation

The following policy recommendations were made from the findings of the study

- i. Preschools should have adequate concrete, visual, audio and audio-visual instructional resources for teaching and learning science for good performance.
- ii. The preschool teachers and parents should attend workshops where they are trained on improvisation of relevant instructional resources from locally available materials.
- iii. The preschool teachers should attend refresher courses to give them deeper understanding of using instructional resources for science work.
- iv. The preschool administration should source for finances from national and county government, and other donors.
- v. It is important that children should be involved in collecting and maintaining instructional materials as this will help them to understand the concepts better.
- vi. Teacher should include hands-on activities when teaching children science. The science lesson should be more practical than theoretical. This is to enhance understanding of science concepts.

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