

## **Influence Of Instructional Materials on Pre-Primary Learner's Acquisition of Science Skills in Tharaka North Sub -County.**

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**Abstract:** The Government recognizes pre-school education as one of the educational cycles which can lay a firm, healthy foundation for children during the formative years. The purpose of this study was to establish the influence of instructional materials on children's acquisition of science skills in pre-primary schools in Tharaka North Sub- County, Tharaka Nithi County, Kenya. This study was based on Active learning theory by Lev Vygotsky. This study utilized a mixed methodology entailing qualitative and quantitative. The target population in this study was 1780 subjects comprising 95 early childhood teachers, 95 head teachers and 1590 pre-school children. Using stratified random sampling the researcher selected 10 teachers from the zones accounting for 10% representation of the target population making a total of ten, the sample of teachers. The instruments for data collection were questionnaires for teachers and head teachers and observation checklist for the children. Piloting of the instruments was carried out in Meru South Sub- County where they were pre-tested to the selected Early Childhood Children. Before data collection, the instruments were administered only once to a sample of 2 teachers and 2 head teachers in two preprimary schools. Cronbach Alpha analysis was computed, to establish the reliability of the instruments, and a coefficient of 0.83 was obtained, and hence the instruments were deemed reliable. As for the content and construct validity of the instruments, the development was done with guidance of the supervisors. The quantitative data was presented in tables, bar graphs, and pie charts. Qualitative data was analyzed thematically by use of themes derived from the responses. The study established that the teachers were of the opinion that the available learning resources not adequate for enhancing the children learning of science activities. There was a strong association between the independent variables and the dependent variables. Based on the findings of the study, the researcher recommends that; The School management, through the county government should lobby for funds that will enhance the pre-schools acquire enough and most appropriate science teaching materials, which will aid in teaching science.

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### **I. INTRODUCTION**

The initial formal socialization agent that a child encounters is through early childhood development education (ECDE) thus it is critical stage in his or her social, intellectual, spiritual, psychological, and mental development process. Nonetheless, ECDE still faces many challenges that the state, teachers, parents, and other interested parties should address. Science learning in early years is not well documented particularly in Kenya. It is important to find out how school based dynamics affects children's science activities in pre-school learning.

Globally, science skills are regarded as a basic requirement that helps all individuals of the society to productively engage in day-to-day socio-economic and technological advancements (Copple & Brekekamp, 2009). Worth and Grollman, (2009) expound that it is through science activities that ECD learners get the chance to play with tools and be exposed to concepts that is crucial to future learning. Notably, children acquire more knowledge by adding new information into their existing frame of reference about the world (National Research Council, 2001). As they carry out science activities in pre-school classrooms their intellectual and linguistic development is enhanced (French, 2004).

Nasibi (2005) argues that engagement of children in science activities such as observing science materials and specimen, experimenting with objects among others, offer kids the chance to learn and acquire science skills such as hypothesizing, inferring, questioning and communicating. This promotes the need to accord young children an opportunity to learn science activities right from home. Thus, school environment plays a critical role in children's science skill acquisition. This study will seek to establish school based factors influencing children's science skills acquisition in pre-primary schools. Research that has been done in Kenya concerning science skill acquisition is low. However, the few that have been done are relevant to this study. Khatete (2010) established that teaching approaches used in pre-primary schools in Kenya are ineffective and facilitates rote learning of science. Khatete indicated that teachers are not guiding children to use the scientific

skills to develop understanding of scientific concepts they learn at school. Instead, children are drilled to memorize scientific concepts, laws, and principles and reproduce them during examinations. This type of teaching does not allow learners to develop science process skills (Recording skills, classifying skills, Observation skills and Manipulation skills) and use them to construct their own understanding of scientific knowledge.

### **Statement of the Problem**

As Kenya gears up to attain vision 2030, Education for All goals, and MDGs, ECDE has been recognized as essential programs of helping the country realize its goals. In Kenya today, there are over six million children under the age of six. Their education, care, socialization, and development are major concerns for the country. The Government recognizes pre-school education as one of the educational cycles, which can lay a firm, healthy foundation for children during the formative years. Teaching science in preschool has become a necessity, as the activities taught at this stage have greater impact in their later learning (Kato & Meeteren, 2008). Pre-primary science activities lay a foundation for children's acquisition of science skills. The acquisition of these skills is determined by the way children are prepared in school. Research findings in Kenya reveal minimum level of children engagement in science activities at school. This probably could be due to lack of knowledge of science from teachers and the significant others and inadequate school resources to acquire materials for science learning at school. Studies conducted in Kenya shows that teachers who engage their children in science activities facilitate them to acquire science skills that makes them perform better in science subjects. However, most of the studies available have not examined how instructional materials may influence children's outcome in science skills acquisition in pre-primary school. This study sought to investigate influence of instructional Materials on children's acquisition of science skills in pre-primary schools in Tharaka North Sub- County, Tharaka Nithi County, Kenya.

### **Research Hypothesis**

The following hypothesis was tested for the significance at 0.05 alpha levels:

**H<sub>01</sub>:** There is no significant association between instructional materials influence and acquisition of science skills by pre-primary learners in Tharaka North Sub- County

### **Significance of the Study**

The recommendations of this study may help generate the much-needed information that would be used by various parties in education sector to enhance the standards of science education taught to children in preschools. This research will have implications for teachers, teacher trainers, curriculum developers, and educational learners conducting studies in the area of ECD.

### **Theoretical Literature Review**

This study was modeled by Active learning theory by Lev Vygotsky's (1978). Active learning, as a teaching method, aims to involve learners in the learning process. This theory is relevant to this study in that it emphasizes the importance of instructional materials in teaching and learning process. Using instructional materials, the learners can comprehend the contents easily, especially in science subjects, where they can conduct experiments, and make observations. In this study, this theory models the first objective; to determine how the instructional materials influence pre-primary learner's acquisition of science skills in Tharaka North Sub -County.

## **II. METHODOLOGY**

This research adopted mixed research methodology, and entails the data collection, analysis of attribute and numerical data. This study entailed concurrent triangulation research design. The design was used to obtain diverse but corresponding findings on the same subject to grasp the problem of the research better. The research study was carried out in Tharaka North sub- County, which is classified as an Arid and Semi-Arid land, Tharaka Nithi County, Kenya. Tharaka-Nithi County is one of the 47 counties of Kenya located in Kenya's former Eastern Province. The county has an area of 2609 km<sup>2</sup> and had a population of 365,330 as of the 2009 census. The targeted population for this research was 1780 subjects consisting of 95 early childhood teachers, 95 head teachers, and 1590 pre-school children. The research utilized stratified random sampling to select teachers proportionally from each zone. A ten percent of the teachers target population was selected. The researcher selected 12 teachers from the zones accounting for 10% representation of the target population making a total of ten, the sample of teachers using stratified random sampling.

Using stratified random sampling, the researcher proportionately selected 99 children to participate in the study. Stratification was done to ensure that each and every zone was represented in the findings of the study. Questionnaire, Interview Schedule and Observation Checklist were applied for data collection. The researcher went through the field data, removed any missing or inaccurate data. Consequently, the researcher

coded the quantitative data and analyzed it using a software used to analyse data known as SPSS. Descriptive analysis was applied in analysis of the quantitative data. Numbers were used to summarize and present the data that has been obtained from the field. This specifically includes frequency counts, percentages, and inferences to establish if there is a link between the variables. Pearson Correlation Product Moment was computed to establish if there is relationship and the nature of the relationship. Qualitative data that was collected from the field was analysed and discussed thematically. This qualitative data obtained supported the quantitative findings as well as elaborate on the concepts obtained.

### III. RESEARCH FINDINGS AND DISCUSSION

#### Gender Distribution of Teachers

The distribution of the sample population by gender was established. By comparing gender distribution of the sample population it would be possible to study the gender distribution of the respondents, and find out if it was biased or there was gender parity among pupils, head teachers and teachers. Figure 1 shows the gender distribution of the respondents.

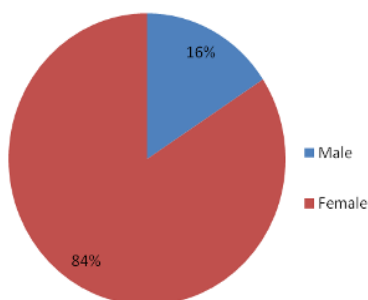


Figure 1: Gender Distribution of Teachers

The figure shows that majority (84%) of the respondents were females. This implies that there was gender disparity in favour of females in the teacher sample population. Female teachers are important according to Boadu (2000) who noted that female teachers are essential in being role models and in providing counseling, especially on issues related to puberty to the girls.

#### Teachers Academic Qualification

On the academic qualifications of the teachers, the study obtained the following findings.

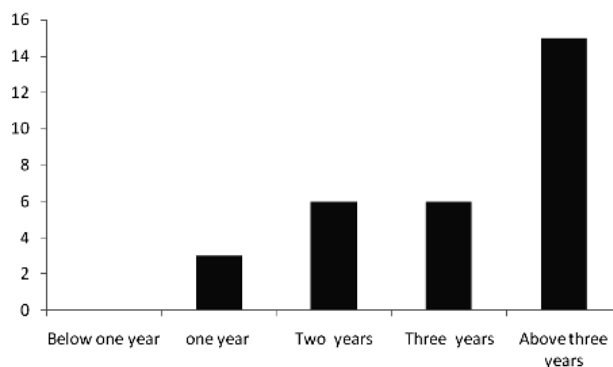
Table 1: Teachers Academic Qualification

Education level	f	%
Masters degree	2	12.5
Bachelors degree	8	50
ECDE Diploma	1	6.25
ECDE Certificate	5	31.25
Others	0	
<b>Total</b>	<b>16</b>	<b>100.0</b>

As seen on Table 1, 6.25% of the teachers ECDE diploma, while 31.25% had an ECDE certificate qualification. As for the head teachers, the information obtained reveals that 50% of the teachers had a bachelor's degree, while only 12.5% had master's degree. It can therefore be adduced from the study that the population of the teachers had various levels of academic qualification with most of the teachers at the certificate level.

#### Tenure of Service

The length of time spent in an organization leads to the development of understandings and experiences. The length of service of teachers was established and findings obtained are presented on the figure 2



**Figure 2: Teachers' Tenure of Service**

According to the obtained in figure 2, majority (50%) of the teachers had served for more than three years. It was elicited that 20% of the teachers had served for 2 and 3 years in the preschools. The length of time spent in an organization leads to the development of shared understandings and experiences (Smoley, 1999). Increased tenure in an organization is positively related to effectiveness, and performance (Mahoney, 1988).

**Influence of Instructional Materials on Pre-Primary Learner's Acquisition of Science Skills  
Descriptive Statistics**

As per objective one, the study sought to establish how the instructional materials influence pre-primary learner's acquisition of science skills in Tharaka North Sub -County. The findings obtained are presented on a 5-point likert scale, and presented on the table 2.

**Table 2: Influence of Instructional Materials on Pre-Primary Learner's Acquisition of Science Skills**

Instructional materials influence on pre-primary school children's acquisition of science skills	SA 5	A 4	U 3	D 2	SD 1	Mean	Std. deviation
Availability of enough science learning materials such as books helps in explaining science to the learners	16.7	66.6	0	16.7	0	3.8	.921
Schools with enough science oriented toys and dolls do help learners understand Science concepts	50	16.7	0	16.7	16.6	3.7	.816
The play materials in the schools are very helpful in teaching of science	16.7	83.3	0	0	0	4.2	1.299
The learners in the pre-schools can learn science from the computers available in the school	0	66.7	0	33.3	0	3.3	.875
The laptops project will help the children learn science in the early stages of life	83.3	0	0	16.7	0	4.5	.712
The available learning resources are adequate for enhancing the children learning of science activities	16.7	0	0	66.7	16.6	2.3	1.217

The data on table 2 reveals that the majority (66%) of the respondents indicated that the availability of enough science learning materials such as books did aid the teachers in explaining science to the learners, as compared to 16% of the respondents who indicated that the books were not enough. These findings agree with Ng'ethe (2004) who also found out that one of the major constraints that face quality of education was overcrowding in classrooms. Most programmes of instruction and pupil service require some physical facilities including school buildings, grounds and equipment that Kenyan public schools often lack.

The Preschools that had enough science oriented toys and dolls did help learners understand Science concepts, as was indicated by 50% of the respondents who strongly agreed, while 16.7% disagreed. These findings agree with the sentiments of Worth and Grollman, (2009) expounded that it is through science activities that ECD learners get the chance to play with tools and be exposed to concepts that is crucial to future learning. Notably, children acquire more knowledge by adding new information into their existing frame of reference about the world (National Research Council, 2001).

The play materials in the preschools were very helpful in teaching and learning of science, as was revealed by the majority (83.8%) of the respondents who agreed. The majority of the respondents (66.7%) agreed that the learners in the pre-schools can learn science from the computers available in the school, as compared to 33.3% of the respondents who disagreed. This was not so in all the schools since the laptop programme in the schools was not fully implemented in all schools in the county.

The majority of the respondents (83.3%) agreed to the opinion that the laptops project would help the children learn science in the early stages of life, while 16.7% disagreed. These findings agree with Musyoka (2013) who acknowledges that most schools have poor facilities, which continue to affect the quality of education offered to students in Kenya. Therefore, it is valid to say that the efforts by parents, community, and individual schools to mobilize resources through fundraising have not raised enough funds for the provision of adequate educational facilities in Rigoma Division.

The study found out that 66.7% of the teachers were of the opinion that the available learning resources not adequate for enhancing the children learning of science activities. The case was similar to a study conducted in Bungoma South, Kenya established that poor and inadequate physical facilities were responsible for poor performance in the area (Bakari, Likoko, &Ndinyo, 2012). These resources needed by schools to perform well include qualified teachers, physical facilities, library, textbooks, furniture, laboratories, and enough playgrounds. The case is similar in Tharaka Nithi County where the resources in the schools were found to be inadequate.

### Inferential Statistics

The study further sought to test the first hypothesis of the study; **H<sub>01</sub>**: there is no significant association between instructional materials influence and acquisition of science skills by pre-primary learners in Tharaka North Sub- County. A Pearson correlation coefficient between one independent variable (instructional materials) and the dependent variable (learner's Acquisition of Science Skills) was calculated and the results are presented on the table 3.

**Table 3: Pearson Correlation between Instructional Materials and Pre-Primary Learner's Acquisition of Science Skills**

			Learner's Acquisition of Science Skills
<b>Instructional Materials</b>	Pearson Correlation	1	.800**
	Sig. (2-tailed)		.000
	N	16	95

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

Table 3 shows that, there was a strong association between the Instructional Materials and Pre-Primary Learner's Acquisition of Science Skills is very high ( $r=0.800$ ) and the correlation coefficient significantly very high ( $P<0.05$ ). This indicates that 64% ( $r^2=0.8^2$ ) of the variations in Instructional Materials affected the Pre-Primary Learner's Acquisition of Science Skills, and hence the null hypothesis **H<sub>01</sub>** was Rejected. Therefore an increase in Instructional Materials, led to increased Learner's Acquisition of Science Skills. These findings are agreeing with the fact that science educators recommend that teachers inquiry-based instructional method that encourages finding solutions to problems is the right pedagogical method for teaching science effectively in preschools (Linn & Jacobs, 2015; Wang, Kinzie, McGuire, & Pan, 2009; Malone, 2008).

### Thematic Analysis of Qualitative Data

In order to collect more information on the influence of instructional materials on pre-primary learner's acquisition of science skills the researcher conducted in depth interviews with the headteachers. The researcher sought to establish if the schools had enough instructional materials to aid the learner's acquire science skills. Teachers 1 said

*, 'Yes. However, it is the parents that have bought the instructional materials since the government does not give the schools funds to acquire the instructional materials'. Teacher T<sub>2</sub> that 'No. They are there but they are not enough. The few ones have been crafted by the teacher, using the locally available materials'.*

These findings indicate that most of the schools did not have enough instructional materials and therefore the administration had to encourage the teachers to craft and improvise on the science teaching aids.

The researcher further sought to establish how instructional materials influenced pre-primary learner's acquisition of science skills.

**Teacher T<sub>3</sub>** revealed that: 'For the learners who manage to acquire the instructional materials, they are really helpful as they help demonstrate the concepts easily'.

**Teacher T<sub>4</sub>** indicated that; 'It becomes difficult to teach all the learners with these materials as they are shared amongst the learners. Enough instruments would really be helpful to the preschoolers'. **Teacher T<sub>5</sub>** indicated that 'The materials would help all the learners learn equally, and grasp the science concepts. However, the disparity in the levels of learning is brought about by the scarce learning materials'.

These findings reveal that the instructional materials have added big advantage to the learner's science acquisition in preschools. However, the common challenge was inadequacy of these materials. The government funding on the same was minimal and hence most of the schools had to rely on the parents and teachers for these materials. These findings agree with Lumuli (2009) who confirmed that the provision of enough learning facilities in schools and personnel ensures that learners receive quality skills (Lumuli, 2009). These facilities include classes, laboratories, libraries, playing fields, textbooks, which go a long way in creating conducive environment that promote effective learning.

#### IV. CONCLUSIONS

Based on the findings of this study, the researcher makes the following conclusions; The availability of the instructional materials had an influence on preschool learner's science learning. However, most of the schools did not have the adequate science learning tools and equipment, and therefore learning was not very efficient.

#### Recommendations for Practice

Based on the findings of the study, the researcher recommends that; The School management, through the county government should lobby for funds that will enhance the pre-schools acquire enough and most appropriate science teaching materials, which will aid in teaching science. These materials should be in line with the required curriculum for science in pre-schools in Kenya.

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