



Influence of Type and Availability of Play Materials on Acquisition of Mathematics Skills by Preschool learners in Baringo Central Sub-County, Baringo County, Kenya

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Abstract: Research has linked the use of play to equipping learners with mathematics skills; yet early grade performance in mathematics remains low. The purpose of this study was to examine the influence of play materials on acquisition of mathematics skills by preschool learners in Baringo Central Sub County. The specific objectives were: to establish the type of play materials for acquisition of mathematics skills by pre-school learners and to determine the availability and adequacy of play materials used for the acquisition of mathematics skills by preschool learners. The target population comprised of 136 head teachers and 272 teachers of the 136 pre-schools. The study adopted descriptive survey design and the sample size was through simple random sampling for class teachers and pupils and purposive sampling technique for Head teachers. A sample size of 41 head teachers and 82 teachers was used representing 30% of the target population. Data collected was analyzed descriptively with the aid of the Statistical Package for Social Sciences (SPSS) version 21. The study findings showed that the main types of play materials used were factory made / assembled and purchased from shops and stationers. The study established that most play materials were not available and those that were available were inadequate in most schools. The study recommended that the schools' management committees should involve all stakeholders to support pre-school centers in acquisition of relevant play materials; mobilize resources to provide pre-service and in-service teachers with knowledge how to use play materials in teaching mathematical skills and how to use available play materials appropriately in teaching mathematical skills to preschoolers.

Key Words: Acquisition, Skills, Pre-School learners, Mathematics, Teacher, Baringo

1. Introduction

The exploratory and inquisitive nature of children should not be affronted. At early stage of life, children notice and discover mathematical dimensions in their environs (Schiro, 2012). Children at this stage of life are able to compare various dimensions such as patterns, building blocks, as well as navigating in space. Mathematics helps children bond with the external environment outside school which gives them a good grounding for school success. Mathematical skills are requisite for success in study disciplines such as science, social studies and other subjects elementary and middle school and thus need to be properly inculcated. Many young children are either in early education situations where, they can have substantial early skills in mathematics or in childcare. A survey of past investigations on early childhood education in the

initial six long periods of life uncovers that early encounters have enduring results (Newman & Newman, 2017).

Type and choice of materials for play for young children is critical. Teachers in preschools need to be cautious when choosing play materials. They should be materials relevant for their intended purpose. This regularly encompasses primarily toys, games, instructional materials, everyday objects, and construction pieces, since they are liked and appreciated by majority. In most schools, absence of proper teaching and learning materials affect beginners' performance in arithmetic (Dooley *et al.*, 2014)

A recent study in the United States of America, kindergarten teachers revealed limited free playtime in most of the kindergarten classrooms (Fesseha & Pyle, 2016). The researchers connected this circumstance to the

expanded request by instructors to have learners with a solid establishment in proficiency and arithmetic in nursery and first score, especially with the usage of the common core standards. Subsequently, there was a noted decrease for time allocated for play as this was replaced by academically focused activities and lessons. The capacity of play as means of teaching mathematics and building the foundation of these children was overlooked.

In United States of America Ramani, Siegler, and Hitti, (2012) and Anderson-McNamee (2010), recognized the role played by the play method in enhancing pupils' acquisition of mathematics skills, and stressed the fact that it was important for pediatricians to provide professional advice on the appropriate play materials or type of play to be used by families, school systems, and communities, and how best to protect play. In Pakistan Bibi and Ali (2012) found that child play in preschools helped contribute to better academic achievement of students in their later grades. In Malaysia a study by Majzub (2014) found child play a useful method of teaching. In the study it was found that teaching learning climate was not the same in the preschool centers: play was only used as a method of teaching preschool children by those teachers who valued it. Nevertheless, most teachers held the view that parents did not appreciate the play approach.

In Africa, most countries that had not earlier appreciated the value of early childhood education now appreciate it. In their many ECDE centers, both public and private, play is a common method of teaching pupils. Through play they are equipped with required numerical skills necessary for later stages of learning. Some of the examples of studies showing how important play method is in enhancing acquisition of mathematics skills among preschool learners in Africa are: in South Africa (Nosisi, 2012), where it was established that play method was a significant predictor to pupils' acquisition of mathematics skills, and also established that lack of foundational knowledge was one of the key factors inhibiting the acquisition of mathematics skills among learners. In Nigeria Omoera (2011) found that play method stimulated creativity and developed a child's social, mental, and emotional skills and was highly appreciated. In Uganda (UNICEF, 2015) stresses the importance of play method in teaching children and describes it as an effective method in the attainment school's learning objectives.

The link between play method and acquisition of skills in preschools in Kenya remains unexplored. Yet, it has been reported that in past studies that play method lays a foundation for preschoolers as it helps learners acquire skills that positively influence their learning at primary school levels. In Kenya, acquisition of mathematics skills in mathematics has been reported to be low in most counties. One such county is Baringo County. Performance in Mathematics by the Kenya Certificate of Primary Education (KCPE) results has remained poor in Baringo County over the years (Kodiaga, 2015). This performance has been attributed to inadequate teaching/

learning materials. Amidst high poverty levels, most schools are not able to stock relevant play materials. There is high reliance on parents for funding the preschool education, yet their socioeconomic status does not favor this. Past studies show that materials inadequacy or unavailability can negatively affect education delivery styles, subsequently affecting the learners' acquisition of mathematics skills (UNICEF, 2015).

The preschool learning process includes important learning-related skills, such as the child's ability to express thoughts, wants and needs verbally, to control his or her emotions, and to show curiosity, concentration, persistence and social competence. It is also proven that there exists a link between numerical skills acquired at the preschool level and subsequent performance in mathematics at later stages of learning. It appears that some school head teachers, and proprietors do not understand the link between play materials and the effectiveness of play way method in enhancing the children's literacy, numerical and cognitive skills (Offenheiser & Holcombe, 2003; Indakwa & Miriti, 2010).

Studies have shown that play materials are not accorded the importance they deserve, instead school managers reduce the allocation and thus resulting into shortage, or acquisition of irrelevant and substandard play materials. Budget restraints and pressure to accumulate wealth, make them avoid purchasing outdoor materials. However, preschools that purchase these materials experience material inadequacy (Waweru, 2013). There is limited research linking play materials with the acquisition of mathematics skills among learners in preschools in Baringo Central Sub-County. A study by Mbakaya (2012) stressed the importance of play materials in steering performance of children in ECDE centers in Baringo. However, this study did not focus on acquisition of mathematics skills among preschoolers. Existing studies are outside Baringo Central, and do not focus directly on play materials. This study therefore examined the influence of play materials on acquisition of mathematics skills by preschool learners in Baringo County.

1.2 Specific Objectives

The specific objectives were:

- i. To establish the type of play materials used for acquisition of mathematics skills by pre-school learners in Baringo Central Sub-County.
- ii. To determine the availability and adequacy of play materials used for the acquisition of mathematics skills by pre-school learners in Baringo Central Sub-County.

2. Literature Review

2.1 Type of Play Materials and Acquisition of Mathematics Skills

Feza (2018) observed that the type of play materials used in kindergartens or preschools greatly determined the performance of children at later stages and specific subject areas such as mathematics, science and English. The study also introduces an interesting aspect, which links socio economic status of children with the ability to access varied types of play materials. The scholar observes that those from middle and upper socio economic preschools tend to quickly acquire mathematics skills compared to those at different developmental levels. Such variations were noted in respect to copying of extended patterns with more focus on color than objects. This was influenced greatly by the mathematics quality young children from 0 to 4 years were exposed to and the practitioners understanding levels in the schools studied.

According to Amato *et al.* (2013), abacus play materials are very useful in equipping learners with mathematical skills. The researcher observes that abacus was used mainly for addition, subtraction, setting and counting operations. The abacus was used also in teaching multiplication skills (digits and fractions), which the researchers described as higher-level mathematical computation skills. The emphasis was on the fact that play method was used by most preschools studied in teaching both simple and complex mathematical skills. The use of technology to support play method appears to have worked almost in every schools visited. However, the use of abacus method has not been studied much in the developing economies and remote locations of Africa and this study demonstrated this fact.

Saracho (2012) revealed the use of concrete materials in most preschools. The researcher observed that concrete materials, or manipulative materials, existed in various forms. These are referred to as physical objects that aid the process of teaching and learning mathematics to learners. Similar to earlier findings by Mastropieri and Scruggs (2010), manipulative materials were found to aid learners acquire several mathematics skills which included operations with integers, addition and subtraction, fraction equivalents, telling time, counting money, measurement, and place value. Children with visual impairments are able to gain concrete experiences through manipulative. These also promote their understanding of the environment they operate and enable them to quickly learn concepts parallel to sighted peers in the classroom setting (Saracho, 2012).

A study by Oncu and Unluer (2010) among 40 learners from four preschools in Kocaeli, Turkey, found that gender of the learners influenced the selection of play materials they deemed fit for creation play. The study found that that girls preferred real objects or household devices more often than boys. In a similar study, Harten, *et al* (2008) found higher activeness in play among the

boys compared to girls. It was noted that boys required much space for games such as football as opposed to girls. This was prompted by boys' competitiveness, exclusiveness, domination and their nature to play in large groups. Therefore, it was important for educators in preschools to ensure that the right type of play materials was used by the right pupil gender, otherwise the tools may turn out to be ineffective in contributing towards academic performance in mathematics.

According to Gbadegesin (2018), report from Nigeria indicated the absence of an organized preprimary education facilities. The report revealed that there were however, a few agencies/organizations that operated preprimary facilities, but this was done without putting into consideration the young age of the preschoolers. The constant exposure of children to play materials that are way beyond their abilities and capabilities was also observed. There was lack of clarity on the identification process of play materials in most preschools studied. The researcher also noted that the preschools did not have the correct type of play materials.

According to Dooley *et al.*, (2014) teachers in preschools need to be extra careful when selecting play materials. They should be materials suitable for their intended purpose. This commonly involves mainly toys, games, instructional materials, everyday objects, and construction pieces, since they are liked and appreciated by majority. In most schools, lack of proper teaching/learning materials affected learners' performance in mathematics. When play materials are minimal learner's morale becomes low and eventually affects their performance.

2.2 Adequacy and Availability of Play Materials

A study by Ramani, Siegler and Hitti (2012) established that learners who played the number board game reported a high classroom improvement in their children's knowledge of numerical skills. Their use by teachings in scaffolding and assisting preschoolers learning about numbers was also observed. Therefore, it emerges that use of the linear number board game contributes favorably towards the acquisition of the learners' Mathematical skills

According to Wambui (2013), gathering and preparation of play materials for lessons takes place prior to teaching / learning owing to the fact the children may not be patient enough to await such time consuming processes. Materials accessibility is greatly determined by factors such as storage availability and upon the own usage habits. For play method to be effective, play materials need to be available for learners in good quantity for timely skills acquisition prerequisite for Mathematics performance.

According to Nguyen, Watts, Duncan, Clements, Sarama, Wolfe and Spitler (2016), availability of specific materials such as building blocks played an important role in the acquisition of mathematics schools by preschoolers. The

process of learner engagement in classroom was made easy through the building blocks play. This fosters engagement in small group activities, classroom activities, and computer games. With this approach preschoolers using the building blocks curriculum registered greater achievement in geometry, numeracy, measurement, and recognition of patterns than those in the control group. The Big Mathematics Little Kids and the Number Worlds are other examples of playful curricula to consider.

Nguyen *et al.*, (2016) observed that adequacy and availability play materials used in a given setting had an impact of the instruction and preparation quality. In other words, Mayindo's study implied that availability of play materials influenced the quality of education offered to preschool learners, subsequently setting the pace for good performance in later stages of learning.

According to Kolokoto (2014), pre-school managers should ensure that age-appropriate play materials such as toys and materials are accessible to children in all areas, both in class and out of class. The scholar recommended that the use of the chart in guiding toy, equipment and material choices. According to National Association for the Education of Young Children (2011) the effectiveness of play in problem solving depends on the availability of play materials such puzzles (with 4-12 pieces); blocks that snap together; objects to sort (by size, color, shape, smell); materials with hooks, buckles, buttons, and snaps. For ages 3 to 6-years-old, puzzles (with 12-20 pieces); collections of small objects to sort by length, blocks that snap together; width, stature, shape, shading, smell, amount, and different highlights; accumulations of plastic container tops; plastic dishes and tops; keys; shells; tallying bears; and little hued squares.

According to a study by Mwonga and Wanyama (2012) in Kenya, play materials availability in schools is critical. The study revealed that these materials ensure that the transition from pre-primary to primary school is smooth. Since then the situation has not changed, given that purchase of play materials in public pre-schools was left as a preserve for parents, who in most cases could not afford relevant materials.

Morales (2015) noted that numerous Mathematical concepts and skills made it difficult for teachers to incorporate play in Mathematics lessons, pressure to complete the syllabus inhibited effective utilization of the play method. One policy is ensuring that teachers are educated on the importance of using play method in teaching Mathematics classes. If this is properly done, then it will conform to the common core standards. This is expected to yield good levels if acquisition of foundational Mathematics skills. A good example is the Department of Human Development and Quantitative Methodology at the University of Maryland, College Park, which emphasizes to its students the importance and requirement to use play materials and games as supplements for Mathematics lessons.

According to Tchordie (2017) adequacy of play materials means that the teacher should ensure that materials to be used for a particular Science class are enough depending on the number of learners using them. Jacinta noted that performance in Science subjects and Mathematics depended on how the institution was able to match materials per pupil and this just meant that inadequate play materials affected performance in target subject areas.

A study by Likoko, Mutsotso and Nasongo (2013) on adequacy of materials for teaching and learning in schools revealed that adequate materials positively contributed to pupils' academic performance. The study emphasized that it was important for teachers to be well informed / trained on how and when to use materials for teaching, since it was clear that materials adequacy was an important determinant of higher pupils' academic performance in subjects such as Mathematics.

A study by Obiagu (2017) in Nigeria revealed higher levels of inadequacies of play materials in public junior schools in comparison to private junior schools. This was cited as a reason why pupils from private schools performed better than those from public schools in Nigeria. Inadequacies were also reported in respect to both learning facilities and textbooks materials. This situation resulted into a compromise of quality acquisition of requisite mathematics skills among preschoolers.

2.3 Theoretical Framework

Vygotsky's socio-cultural theory developed by psychologist Lev Vygotsky in 1978 informed this study. The theory stresses the fact that all children have potential for learning and thus should be given the opportunity to explore and actualize this potential. Three important tenets of the socio-cultural theory are put forward by Aimin (2013), they include multiculturalism, mediation and learning potential. Play materials are psychological tools described by Vygotskian under the multiculturalism component. Under this concept the theorist supports the concept of using diverse play materials in teaching children. Play materials thus help children internalize and use them in the mastering of new ideas. Therefore, according to this theory play materials are therefore useful psychological tools in a child. The process of learner engagement in classroom was made easy through the building blocks play. This fosters engagement in small group activities, classroom activities, and computer games (Greenhow & Lewin, 2016).

Lev Vygotsky believed that parents, caregivers, peers, and the culture at large were responsible for developing higher order functions. According to Vygotsky, learning has its basis in interacting with other people.

This theory is pertinent to this examination in light of the fact that in preschools today, children learn most effortlessly through the medium of their play. Children need psychological tools to enhance the effectiveness of play in preschools. Familiar play materials could remain of interest to children, but older children use the same or

similar materials in qualitatively different ways. Inadequacy and availability of these play materials negatively affects their Acquisition of Mathematics Skills in closely related subjects such as mathematics.

3. Methodology

3.1 Research Design

The study adopted the descriptive survey design owing to the fact that data collected was also descriptive in nature.

3.2 Target Population, Sample Size and Sampling Procedures

Table 1: Sample Size Determination

Population Category	Sample of Schools	Target per school	Sub-Sample
Head Teachers 136	41	1	41
Teachers 272	41	2	82
Total			123

The study used simple random sampling technique in selection of teachers through lottery technique. The same was replicated in the four instructive zones of Baringo Central Sub County. This was to give each of the educational zones an equal chance of participation in the study. The sample was distributed equally in five.

3.3 Research Instruments

This research study used questionnaires and checklist. Questionnaires were used to collect data from teachers while, interview schedules were used to collect data from the head teachers.

3.4 Data Analysis Procedures

The study collected both qualitative and quantitative data. The collected data was categorized, edited, coded, and analyzed. Qualitative data obtained from the open-ended items was analyzed with similar answers grouped

The target population of the study was made up of 136 public preschools in Baringo Central Sub County, 136 preschools, 136 head teachers and 286 teachers were accessed. The study used stratified sampling technique for the sample size. Two strata were used that is, namely Head teachers and teachers. Sample selection was through simple random sampling technique. A sample representing (30%) of the target population was used for the study as recommendation by Gall, Gall & Borg (2003). A sample of 41 pre-schools was used. In each of the 41 pre-schools, the study used one (1) head teacher per school and two (2) teachers per school as in Table 1.

together according to the responses from themes for analysis. The main themes and patterns in the responses were identified and analyzed to determine the adequacy, usefulness and consistency of the information. Quantitative data was computed by use of descriptive statistics (frequencies, means and percentages) with the aid of SPSS Version 21 and Microsoft Excel 2010. The results were presented in form of tables and charts.

4. Results and Discussions

The first objective sought to establish the type of play materials used for acquisition of mathematics skills by pre-school learners in Baringo Central Sub County. The study established that the main types of play materials used were collections of small objects sort by length, width, height, shape, color, smell, quantity, and other features at 66(80.5%). Further, it is important to note that in most schools 64(78.0%), the play materials were factory made / assembled and purchased from shops and stationers as shown in table 2.

Table 2. Type of Materials

Description		Used	Not used	Total
Collections of different types and shapes of small objects	F	66	16	82
	%	80.5	19.5	100
Collections of plastic bottle caps	F	10	72	82
	%	12.2	87.8	100
They are factory made / assembled and purchased from shops and stationers	F	64	18	82
	%	78	22	100

This scenario depicts that majority of the preschool teachers use play method when teaching mathematics. The findings are in agreement with a study by Hutchinson and Pournara (2011) who observed that the type of play materials used in kindergartens or pre-schools greatly determined the performance of children at later stages and specific subject areas such as mathematics.

The teachers were convinced that the types of play materials used were relevant in teaching Mathematics skills in the pre-schools. The types of materials used were those deemed helpful to pre-school learners. Hutchinson and Pournara (2011) reported high ability to copy

extended patterns with more focus on color than objects used at different developmental levels among learners' aged four and half year old and above from middle and upper socio economic ECD centers were. This is important, as Nwokah (2009) found out that play materials used by the teachers should be that which is suitable for their intervention strategies. In this case, they should be suitable in aiding the acquisition of mathematics skills among pre-school learners in Baringo Central Sub County. Regression analysis was involved to establish relationship between type of materials and acquisition of mathematics skills. The results are indicated in table 3.

Table 3: Model Summary of Type of Play Materials and Acquisition of Mathematics Skills

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.301	.090	.088	.53388

Source: Researcher, 2019

Table 3 shows coefficient of correlation (R) and determination (R^2) which explains the degree of association between type of play materials and acquisition of mathematics skills by preprimary school learners. The model summary indicated that $R = 0.301$ and $R^2 = 0.090$. R-value gives an indication that there is a linear relationship between the type of play materials and acquisition of mathematics skills by preprimary school

learners. The R^2 indicates that explanatory power of the independent variables is 0.090. This means that the type of play materials explains about 9.0 percent of the variation in acquisition of mathematics skills by preprimary school learners. Further analysis of variance was conducted on type of play materials and acquisition of mathematical skills as shown in table 4.

Table 4: ANOVA on Type of Play Materials and Acquisition of Mathematics Skills

ANOVA						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8.061	1	8.061	27.970	.000
	Residual	79.252	79	.288		
	Total	87.313	81			

The F value indicates that the variable in the equation was significant hence the regression is important. The F-statistics at ($F=27.970$) was significant at $p=0.000$ thus confirmed the fitness of the model. Therefore, there was statistically significant relationship between type of play materials and acquisition of mathematics skills. This means that the independent variable is a significant predictor of the dependent variable. Dooley *et al.*, (2014) postulates that teachers in preschools need to be extra careful when selecting various types of play materials.

They should choose materials suitable for their intended purpose.

The second objective sought to determine the availability and adequacy of play materials used for the acquisition of mathematics skills by pre-school learners in Baringo Central Sub County. The findings revealed the following level of availability of play materials: Toys (Mean=2.63, Std Dev=.923); balls (mean=2.41, Std Dev=0.719); abacus materials (clay, stones) (mean=2.10, Std Dev=0.621); construction pieces (mean=2.16, Std Dev=0.777); Building blocks (mean=2.30, Std

Dev=1.027); materials with hooks, buttons, buckles and snaps (mean=3.44, Std Dev=.983); Collections of small objects to sort by length, width, height, shape, color, smell, quantity, and other features (mean=2.23, Std

Dev=0.934); and accumulations of plastic container tops; plastic dishes and covers; keys; shells; tallying bears and little-hued squares (mean=2.12, Std Dev=1.023) as shown in table 5.

Table 5: Level of Adequacy of Play Materials

	N	Minimum	Maximum	Mean	Std. Deviation
Toys	82	1	4	2.63	.923
Balls	82	1	4	2.41	.719
Abacus Materials (clay, stones etc)	82	1	3	2.10	.621
Construction pieces	82	1	4	2.16	.777
Building blocks	82	1	4	2.30	1.027
Materials with hooks, buttons, buckles, and snaps	82	1	4	3.44	.983
Collections of variety of small objects	82	1	4	2.23	.934
Collections of assorted plastic play materials	82	1	4	2.12	1.023
Valid N (listwise)	82				

The rest of the types of play materials were not available in most schools. This was a critical issue, given that play materials availability made teaching easy and contributes to quality learning outcomes in pre-schools. According to a study by Mwonga and Wanyama (2012) in Kenya, play materials availability in schools is critical, and positively contributes towards acquisition of Mathematics skills among learners. The study revealed that these materials ensure that the transition from pre-primary to primary school is smooth.

Moreover the study established that most of the pre-schools had inadequate play materials. The toys were established to have (mean=2.63, Std Dev=0.923); balls (mean=2.41, Std Dev=0.719); abacus materials (mean=2.10, Std Dev=0.621); construction pieces (mean=2.16, Std Dev=0.777); building blocks

(mean=2.30, Std Dev=1.027) and materials with hooks, buttons, buckles, and snaps (mean=3.44, Std Dev=0.983); collections of variety of small objects (mean=2.23, Std Dev=0.934) and collection of assorted plastic play materials (mean=2.12, Std Dev=1.023). All the rest of play materials were adequate in most of the schools. Inadequacy of play materials was a possible impediment towards acquisition of Mathematics skills among learners in pre-schools. Inadequacy of play materials could be because these pre-schools are located in a rural setting. Most pre-schools in Baringo Sub-County are located in a rural setting.

Regression analysis was further engaged to establish relationship between availability of play materials and acquisition of mathematics skills as shown in table 6.

Table 6: Model Summary of Availability of Play Materials & Acquisition of mathematics skills

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.466	.217	.215	.49845

Table 6 show correlation coefficient (R) and determination (R^2) which explains the degree of association between availability of play materials and acquisition of mathematics skills. The model summary indicated that $R = 0.466$ and $R^2 = 0.217$. R value gives an indication that there is a linear relationship between Availability of play materials and acquisition of mathematics skills. The R^2 indicates that explanatory power of the independent variables is 0.217. This means that about 21.7 percent of the variation in acquisition of

mathematics skills is explained by the Availability of play materials.

This argument is in agreement with a study by Rotumoi and Too (2012) who established the challenges inadequate play learning materials, shortage of trained pre-school teachers and lack of health and nutrition services in public pre-schools in poor urban areas are often characterized by. Analysis of variance was conducted on availability of play materials and acquisition of mathematical skills as shown in table 7.

Table 7: ANOVA on Availability of Play Materials and Acquisition of Mathematics Skills

ANOVA						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	18.990	1	18.990	76.433	.000
	Residual	68.323	88	.248		
	Total	87.313	81			

The F value indicated that the variable in the equation was important hence regression was significant. The F-statistics produced ($F = 76.433$) which was significant at $p=0.000$ thus confirms the fitness of the model. Therefore, there was statistically significant relationship between availability of play materials and acquisition of mathematics skills by pre-school learners. This means that the independent variable (Availability of play materials) is a significant predictor of the dependent variable (acquisition of mathematics skills).

This finding is in harmony with a study by Likoko, Mutsotso and Nasongo (2013) who established that adequate play materials positively contributed to pupils' academic performance. Therefore, inadequacy of play materials negatively affected learners' acquisition of Mathematics skills in Baringo Central Sub County.

5. Conclusion and Recommendations

5.1 Conclusions

Conclusively, the play materials used by teachers in teaching mathematical skills among preschool learners in Baringo Central Sub-County were mostly locally assembled and unsophisticated. Worse still these play materials were not adequate in most of the public preschools in Baringo Central Sub -County. This was most likely due to the fact that the public schools were located in areas characterized by low socioeconomic status. Therefore, the schools could not afford the play materials. Availability and appropriateness of play facilities was crucial and necessary for this determines children's socialization, coverage of activity areas and development of psychomotor skills.

5.2 Recommendations

The school boards of management should consider bringing all stakeholders on board to support pre-school centers that are under community and public primary schools. This will ensure that required relevant play materials are available and learners will benefit from them

by developing competencies in mathematical skills.

The school boards of management should consider mobilizing resources to provide pre-service and in-service teachers with more activities related to how to use play materials in teaching mathematical skills to preschoolers, which leads to more developmentally appropriate attitudes toward teaching mathematics to children.

The school boards of management should consider ensuring that teachers use correctly available play materials in teaching mathematical skills to preschoolers. This can be achieved by strengthening school leadership so that there is regular and quality supervision and evaluation of preschool teachers 'work.

The school boards of management should consider sensitizing and encouraging parents to buy relevant play materials for their children to use while at home.

References

- Aimin, L. (2013). The study of second language acquisition under socio-cultural theory. *American Journal of Educational Research*, 1(5), 162-167.
- Amato, S., Hong, S., & Rosenblum, P. (2013). The abacus: Instruction by teachers of students with visual impairments. *Journal of Visual Impairment and Blindness*, 107(4), 262-272.
- Anderson-McNamee, J. (2010). *The Importance of Play in Early Childhood Development*. Montana State University.
- Bibi, W. & Ali, A. (2012). The Impact of Pre-school Education on the Academic Achievements of Primary School Students. *The Dialogue*, 2 (2), 152-159
- Dooley, T., Dunphy, E., Shiel, G., O'Connor, M., & Travers, J. (2014). *Mathematics in early*

- childhood and primary education (3-8 years). Teaching and learning, (18).
- Fesseha, E., & Pyle, A. (2016). Conceptualizing play-based learning from kindergarten teachers' perspectives. *International Journal of Early Years Education*, 24(3), 361-377.
- Feza, N. N. (2018). The Socioeconomic Status Label Associated With Mathematics. In *Global Ideologies Surrounding Children's Rights and Social Justice* (pp. 186-203). IGI Global.
- Gbadegesin, T. F. (2018). *The Assessment of Quality in Early Childhood Care and Education in Nigeria* (Doctoral dissertation, University of Leeds).
- Greenhow, C., & Lewin, C. (2016). Social media and education: conceptualizing the boundaries of formal and informal learning. *Learning, Media and Technology*, 41(1), 6-30.
- Kodiaga, T. (2015). *IESMF Kenya GPE Primary Education Development Project*. EMC Consultants Ltd, Shelter Afrique Centre, Nairobi.
- Kolokoto, M. G. (2014). *The Role of School Management in Promoting Healthy Learning Environments for Grade R learners* (Doctoral dissertation, North West University).
- Likoko, S. Mutsotso, S. and Nasongo, J. (2013). The Adequacy of Instructional Materials and Physical Facilities and their Effects on Quality of Teacher Preparation in Emerging Private Primary. *International Journal of Science and Research (IJSR)*, India Online ISSN: 2319-7064
- Majzub, R. (2014). *Teaching and Learning Reading Through Play*.
- Mastropieri, M. A., & Scruggs, T.E. (2010). *The Inclusive Classroom: Strategies for Effective Differentiated Instruction* (4th ed.). Upper Saddle River, NJ: Merrill.
- Morales Towns, A. R. (2015). *Culturally Responsive Math Curriculum: First Grade Dual Language Immersion Addition Unit*.
- Mwonga, S. and Wanyama, M. (2012). Dealing with the prevailing attitudes and challenges for effective implementation of ECD Music and Movement Curriculum in Eldoret Municipality, Kenya. *Research Journal in Organizational Psychology and Education Studies*. 1(5), 295-302.
- Newman, B. M., & Newman, P. R. (2017). *Development through life: A psychosocial approach*. Cengage Learning.
- Nguyen, T., Watts, T. W., Duncan, G. J., Clements, D. H., Sarama, J. S., Wolfe, C., & Spitler, M. E. (2016). Which preschool mathematics competencies are most predictive of fifth grade achievement?. *Early childhood research quarterly*, 36, 550-560.
- Nosisi, N. (2012). *Can we afford to wait any longer? Pre-school children are ready to learn mathematics*. *South African Journal of Childhood Education*, 2(2): 58-73.
- Nwokah, E., Hsu, H. C., & Gulker, H. (2013). The Use of Play Materials in Early Intervention: The Dilemma of Poverty. *American Journal of Play*, 5(2), 187-218.
- Obiagu, A. N. (2017). *Effect of Concept Mapping on Peace and Conflict Concepts Attainment and Transfer in Junior Secondary Social Studies in Abia State*.
- Oncu, E. C., & Unluer, E. (2010). Preschool children's using of play materials creatively. *Procedia Social and Behavioural Sciences*, 2(1), 4457-4461.
- Ramani, G.B. & Siegler, R.S. (2011). Reducing the gap in numerical knowledge between low- and middle-income preschoolers. *Journal of Applied Developmental Psychology*, 32, 146-159.
- Ramani, G.B., Siegler, R.S., & Hitti, A. (2012). Taking it to the classroom: Number board games as a small group learning activity. *Journal of Educational Psychology*, 104 (3), 661-672.
- Rotumoi, J. & Too, J. K. (2012). Factors Influencing the Choice of Approaches Used by Pre-School Teachers in Baringo County, Kenya. *International Journal of Academic Research in Progressive Education and Development*, 1(2), 177-187.
- Saracho, O. (2012). *An Integrated Play-Based Curriculum for Young Children*. New York, NY: Routledge.
- Schiro, M. (2012). *Curriculum theory: Conflicting Visions and Enduring Concerns*. Sage.
- Tchordie, J. (2017). *The Role of Instructional Materials On Academic Achievement In*

Agricultural Science Among Senior High School Students In Ho Municipality In The Volta Region Of Ghana.

- UNICEF, (2015). *Situation Analysis of Children in Uganda*. Ministry of Gender, Labour and Social Development and UNICEF Uganda.
- Wambui, S. E. (2013). *Effect of use of instructional materials on learner participation in science classroom in preschool in kiine zone Kirinyaga County Kenya*. Unpublished M. Ed Project.
- Wamsted, J. O. (2013). *A High School Mathematics Teacher Tacking Through The Middle Way: Toward A Critical Postmodern Autoethnography In Mathematics Education*.