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Fine Motor Proficiency as a Predictor of Pen Handling Among Pre-Primary 1 Learners In Kakamega East Sub County, Kakamega County, Kenya

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ABSTRACT
There is a strong link between the physical domains under which there is development of fine motor skills that influence writing outcomes of preschool children. The fact that there are studies on numeracy and literacy skills in general and there is no single study on writing as a component yet it is the basis of learning makes it alarming thus special attention is required to ensure proper writing outcomes among pre-primary 1 learners . The regression analysis results indicated that 62.4% of the variation in pen-handling could be explained by fine motor proficiency among pre-primary 1 learners. The study findings therefore indicated a strong positive linear relationship shown by the gradient of the equation ranging from 0.1- 0.5 hence with increase in fine motor proficiency, there was also an increase in pen-handling. The study recommended capacity building for pre-school teachers to equip them with relevant fine motor skill knowledge to allow them to positively impact learner's writing outcomes.

Key Words: Fine motor proficiency, Pre-primary 1, Pen-handling, Motor skills, Writing outcomes,

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I. Background

Early Years of Education is very critical in children's' learning process as it aids in school readiness. Yamin & Sanan (2019) looked at this component of education as an effort to develop all the aspects of a child's growth in order to have the readiness to study at the next level of education. This is in line with the UNESCO's (2010) statement that children who engage in high quality early childhood education activities demonstrate gains in educational, social, intellectual, and health development. Early learning experiences enhance children's' literacy skills through the learning environment which exposes learners to the use and manipulation of physical activities that later on result in motor development of children hence improvements in the literacy skills such as reading and writing (Arango 2001). In case children miss this early education, they tend to have problems with their behavioural, socialization, and cognitive development which affects their later academic outcomes (Goodman & Sianesi 2005).

According to Arango (2001), the skills involved in holistic development of 4-5 year old children are cognitive, physical, social, emotional, and creative skills. Similarly, fine motor skill is the coordination of fine muscles and in movements usually involving the synchronisation of hands and fingers with the eyes. This implies that complex levels of manual dexterity that humans exhibit can be attributed to and demonstrated in tasks controlled by the nervous system that are associated with academic achievement. This is seen in a U.S study where 5 year old children with strong fine motor skills performed more optimally than peers with weak fine motor skills in math and reading. Children without motor proficiency may have a harder time keeping up with their peers which might make them less likely to participate in pen handling which is the holding of the pen or pencil while writing where the index finger should cover the thumb instead of resting on the pencil. Also, the thumb should be on the opposite side and holding against the pencil with the whole hand arched like a fist around the pen.

As of motor movements, preschool children aged 4-5 years are expected to increase their speed, can go up and down the stairs alone and also start to have more control in activities such as playing ball games or riding their tricycles (Pienaar et al, 2014). According to Morrow (2009), dramatic play improves learner's knowledge on the use of printed text in real life situations and how it enhances learner's early writing development. This happens through practices of realistic settings and functional reasons for using print. Research indicated that activities that could help learners in developing their early writing skills is through teachers creation of housekeeping centres as kinds of dramatic play experiences, noting down phone texts and writing notes. As they

continue with their development, the earlier skills refine where the five year olds continue to improve their fine motor skills as well (Özkür, 2019). They can tie their shoes, brush their teeth, wear their clothes, comb their hair, and eat independently. Besides, they can draw simple figures and duplicate shapes and letters. As they master fine motor skills, they also use crayons and pencils and paint with better control (Purtaş & Duman, 2017).

In Kenya, the ECDE curriculum has been designed in a way that it allows an hour daily on the timetable for both indoor and outdoor play activities. The main objective of these activities is to stimulate learner's motor development including fine motor skills which are necessary in pen-handling. According to Johnson et al (2010), both indoor and outdoor activities enable learners to enjoy where there is stimulation of the brain for creativity and mental development necessary in the preparation of future school learning. It is the teachers' role to know how to allocate the given time for either outdoor or indoor play activities (McClintic & Petty 2015). Park (2019) stipulated that during play, the activities are divided into structured and unstructured where the structured activities involve directions and guidance from the teacher, whereas the unstructured play involves learners taking control of what play activities they engage in without directions from the teacher. In structured play, the activities are structured to be vigorous so as to activate the learners and they include all children regardless of their differences.

The play activities should be developmentally appropriate and supportive of motor skill development. Through the unstructured play, the teachers are expected to provide activity supportive movable materials, riding vehicles that improve fine motor skills development and manipulative objects (Nicaise, Kahan & Sallis 2011). Kilgour (2006) looked at the major components of the learning environment as neat and well arranged classrooms and age appropriate play materials. The activities required in effective motor exploration by pre-primaries 1 learners are playing with dough, threading with beads, finger painting, tracing, colouring, and joining dots among others (Ranson 2013). However, due to lack of resources, teachers don't focus on the same. Also, teachers lack of experience and professionalism results into lack of activities in fine motor skills. This is because teachers cannot indulge learners in activities they are not familiar with which results in inadequate fine motor practices hence poor writing outcomes (Moses & Mohamad 2019).

Problem Statement

The fact that writing is the backbone of academic outcomes and studies are only talking about numeracy and literacy without focusing on the writing aspect calls for the need to find out about writing. Fareed et al (2016) stated that the undermining of the state and importance of writing affects its development because writing is always not considered as an essential teaching and learning element of syntax and grammar. In Kakamega County, the latest Uwezo report of 2016 indicated that those unable to identify letters are 17.6% which is an alarming report. Also, numerous studies have been talking about reading without incorporating writing. An example of such is the study of Kucukoglu (2013) which identified that it is important to identify appropriate reading teaching strategies for learner's comprehension. This study left out the writing aspect which is also an important learning component. Owing to the fact that there is nothing touching on writing makes it interesting to find out about pre-primary 1 learners writing outcomes. Also, the fact that there is little research on the researchers' knowledge that has been undertaken on fine motor proficiency as a predictor of writing outcomes in Kakamega East sub county makes it possible to look at fine motor and pen-handling.

Objective and Purpose of the Study

The study aimed at determining the effect of fine motor proficiency on pre-primary 1 leraner's pen-handling in Kakamega East sub county, Kakamega County, Kenya.

II. Literature Review

Writing outcomes are the activities involved in composing text that is legible enough and able to be read. Proper writing outcomes are important as they contribute to reading fluency because they activate visual perception of letters. Also, they are predictors of success in other learning areas as they have a positive impact on future academic schooling (Williams 2015). One major writing outcome is pen-handling which involves how one holds the pen and pencil for them to write appropriately. According to Tech handwriting (2012), poor fine motor skills and hand strength have effects on children's ability to learn and develop good handwriting making it difficult to master grip patterns thus children are struggling to hold pencils correctly while drawing and writing. This is because of children's reliance on the use of technology which affects their hand strength and fine motor skills. For children to complete everyday tasks such as picking up and carrying objects, dressing, using a knife and fork, they need precision, power, precision and stability or a combination of all these (Lin 2017). Moreover, Lin (2017) suggested that learners need to know the grip style together with other skills that help them to effectively use fork, scissors or knife as they learn to hold a pencil in an appropriate grip once they

have started school. Teachers and caregivers are therefore called upon to teach learners proper grip formation because failure to do so cultivates negative habits which becomes difficult to change.

In order to have proper pen-handling, learners also need to have proper sensory perception which sends appropriate texts to the brain when one is touching and holding objects such as pencils. Teachers must incorporate exercises and plays that are friendly for pre-primary learners to assist in improving their sensory perception skills which enables in holding a pencil correctly and using the right pressure when writing which help in improving their handwriting (Huffman & Fortenberry 2011). The strengthening of the whole arm to finger tip muscles provides children with energy required for manipulation of mark-making apparatus. The developed strength and control of the hand and fingers supports the beginnings of a pincer grip, useful for gripping pencils and pens (Lin 2017). Hence, fine motor proficiency can be developed through experiences involving materials that support building strength in the arms, hands, and fingers as well as opportunities to mark-make, draw and write. Also, children's fine motor skills can be seen as a set of capacities that form a system of perceptual-motor skills which include both fine and gross motor-abilities which enhances muscle development necessary for fine motor skills for writing (Cadoret, 2018). There is also improved building of strength in the whole arm for the development of more detailed strength and control of the hands and dexterity in the finger tips (Huffman &Fortenberry 2011).

According to Wang (2014); Oberer, Gashaj & Roebers, (2017), a justification for the importance of fine motor as a learning focus for emergent literacy is evident in the association between fine motor development and other aspects of language, literacy, and intellectual development. Although this research specifically based on fine motor proficiency and pen-handling as a writing outcome. This is because writing is connected with future academic success (Suggate, Pufke & Stoeger, 2018). Also, fine motor dexterity is required in handwriting development throughout early childhood (van der Fels et al. 2015). According to Dinehart (2015), a good pencil hold allows children to make small finger movements by keeping their wrist steady which helps them in moving a pen or pencil in various directions to allow for the making of curved straight short lines that are important in writing.

Most young children use the palmer grip by holding the palm and pencil pointing out between their thumb and forefinger. This position changes by three to four years for the fingers to hold the front and end of a pencil with the lower end enhanced with a straight wrist by the forefinger and the thumb. Stability of the pencil is then ensured by the side of the index and middle fingers and the thumb with the middle and ring fingers lightly touching the palm while the wrist is held straight in a tripod stand (Cameron et al. 2016). Hence, children with hyperactive mobility problems, autism, dysgraphia and dyspraxia may find writing tiring, difficult or uncomfortable particularly if they have a varied form of hold on their pencil. At times, the use of proper pencil grip and best support that provides stability when holding the pencil can help in improving as well as correcting these problems (Dinehart 2015). The most important factor in writing is for children's hold to allow them control the nib or point of the pencil or pen through proper smaller finger movements. A pencil grip/support may help incases where children make finger straightening or bending where wrist movements make the pencil to point on the paper because the pencil is being gripped too strongly or the fingers are too bent. Also, if children hold pencils with very straight fingers and thumb, the wrist movements are used to make the pencil point create short strokes (Suggate 2018).

In order to improve pen-handling, educators and specialists encourage the application of a supported pencil grip to enhance comfort while holding the pencil. They recommend for a special pencil grip for effective finger movement. Hence, instructors are expected to identify a comfortable grip that permits small bending and straightening of learner's finger movements while writing. Initially when children hold a pencil, they grasp with their entire hand around it because they have not developed the hand control to isolate their fingers from their palms (Pienaar et al 2014). However, they must first of all be in a position to isolate their fingers from their palm for them to hold their pencil with fingers. According to Williams (2015), this progresses as they develop more experience with fine motor activities which allows them in establishing more control over their fingers allowing them to develop a dynamic pencil grasp through holding their pencil with the fingers. Children should be involved in activities that improve and promote pen-handling such as messy play for them to write appropriately. Therefore as a result of the insufficiency of studies in the area of fine motor proficiency and writing, an investigation was done to establish the effect of fine motor proficiency on pre-primary 1 learner's pen-handling as a writing outcome.

Similarly, The Australian Occupational Therapy Journal research (2017) carried out a study on the examination of pen-handling kinetics during writing tasks of 181 school age children aged 5-12 years to investigate the relationship between the kinetic factors and fine motor skills. A force acquisition pen was used to measure the forces applied from the digits where pen-tip were measured during writing tasks and each child's fine motor skills were also evaluated. The results indicated that force control when handling a pen is significantly related with fine motor performance, particularly manual dexterity. However, regardless of various studies that used varied numbers of learners, the current study used 385 parents who gave their views and

opinions based on pre-primary 1 learner's fine motor proficiency and pen-handling. As such, existing research on this topic lacks study on the effect of fine motor skills on pen-handling. Therefore, the present study tried to examine the effect of fine motor skills on pen-handling among pre-primary 1 learners.

III. Materials and Methods

The study adopted a descriptive survey research design where descriptive design was used in the enhancement of the research findings by balancing strengths of a certain form of data with the weaknesses of other data type for proper comprehension through the incorporation of the two methods (Creswell & Creswell 2017). The study was conducted in Kakamega East Sub County which is found in Kakamega County in Kenya. In Kakamega East Sub County, there are six wards and 97 public preschools. The researcher used purposive sampling to get six public preschools and 6 teachers-in-charge who participated in the study. Purposive sampling was used because it focused on particular characteristics of a population that were of interest hence it facilitated accurate responding to the interview questions. Proportionate

sampling was used to select the 385 parents because it is accurately used in a study population that is made up of different small groups that vary in composition and their number in relation to the entire population identifies the number of study participants from each group (Raj 2020).

IV. Research Instruments

The research instruments were parent's questionnaires, teachers-in-charge interview schedules, observation checklists and document analysis guide. The parent's questionnaires were designed for the sampled parents to enable data collection on parent's views and opinions on learners' fine motor proficiency and pen-handling. The study modified the Kenya Schools Readiness Assessment Tool (KSRAT 2015) developed by the Ministry of Education to assess pre-primary 1 learners proficiency and pen-handling using a score of 1-5 marks with 5=Excellent; 4=Very Good; 3=Good; 2=Satisfactory; 1= Fair with a maximum score of 50 for each of the items for a given competency. The researcher in form of oral in-depth questions also administered interview schedules for the sampled teacher-in-charge. The interview schedules involved stimulating and follow-up questions that offered information about respondent's inner meanings as well as ways of thinking. The researcher also used the structured observation where data was collected in line to a pre-determined routine which enabled the establishment of effect of fine motor proficiency on pen-handling among pre-primary 1 learner. Another instrument was the document analysis guide which was designed and used to gather data on the presence of instructional materials and details of fine motor proficiency and pen-handling of pre-primary 1 learners.

V. Data Collection Procedures

Pilot testing was also done to develop a research procedure and to evaluate the workability and the sensible nature of the protocol. The research instruments were developed with close discussions with specialists in the department of education psychology, Masinde Muliro University of Science and Technology who ascertained their content (Foxcroft 2004) together with the findings from the pilot study. Test-retest method was used to check the research instruments reliability using the respondents who did not participate in the actual study since it was unlikely to eliminate any temporary factors that would have influenced other alternative methods of reliability testing (Burns & Burns, 2008). The researcher sought permission from the school of graduate studies, Masinde Muliro University of Science and Technology (MMUST) after which the permit from National Commission for Science Technology and Innovations (NACOSTI) was also sought. Qualitative and quantitative data was analysed using means, frequencies, percentages, central tendencies and simple linear regression. Data gathered from the research instruments was presented in form of tables and graphs.

VI. Consent from Respondents

Consent from parents and teachers-in-charge who were part of the study was sought and only those parents and teachers-in-charge who were willing to partake of the study were involved. There was adequate briefing of the respondents on how to fill the questionnaires for the parents and how to respond to the interview questions for the teachers-in-charge. The respondents were assured of the privacy of the data requested for because no one was expected to write their names on the questionnaires or the interview schedules. The data collected was only to be used for the justification of the study and in no way was the researcher corrupted or applied other unwanted means to get information for this study.

VII. Results

The objective of the study was to determine the effect of fine motor proficiency on pre-primary 1 learners pen-handling in public preschools in Kakamega East sub-county, Kakamega County, Kenya. The study modelled the effect of fine motor proficiency on pre-primary 1 learners pen-handling in public pre-schools using

simple linear regression analysis. In the model, the value of the coefficient indicated pre-primary 1 learners pen-handling where the significance of the relationship between the independent variable and the dependent variable was tested at α=0.05

Pre-primary 1 Learners Fine motor Proficiency and Pen-handling Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.790[a]	0.624	0.577	137.97893

a. Predictors: (Constant) Fine motor proficiency

R results represent a strong positive correlation (0.790) between fine motor proficiency and pen-handling. The results of R Square depicted how much of the variation in pen-handling could be explained by fine motor proficiency. Thus, 0.624 which is 62.4% of the variation in pen-handling could be explained by fine motor proficiency.

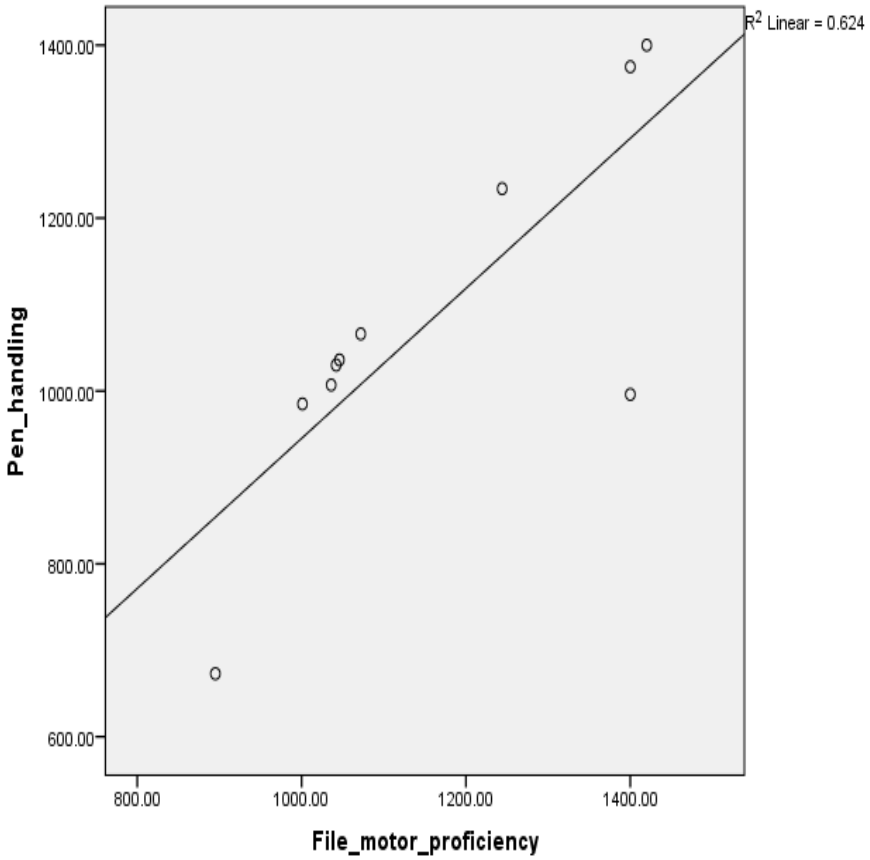
Pre-primary 1 Learners Fine motor Proficiency and Pen-handling Coefficients

Model	Unstandardized coefficients B	Std. Error	Standardized coefficients Beta	T	Sig
(Constant)	77.195	278.834		277	0.789
1.Fine motor proficiency	0.868	0.238	0.790	3.642	0.007

a. Dependent Variable: Pen-handling

From the table, the constant coefficient is 77.195 which is β_0 while the coefficient of fine motor proficiency is 0.868 $_{\beta 1}$ which gave us the equation; y= $\beta_0 + \beta_1 X$ which is y= 77.195 + 0.868X where x is the value of fine motor proficiency. This equation was further explained by the scatter graph of a straight line which showed a positive correlation between fine motor proficiency and pre-primary 1 learners pen-handling.

Pre-primary 1 Learners' Fine Motor Proficiency and Pen-handling Scatter Graph



VIII. Discussion

The linear regression analysis results showed that selected pen-handling variables (exercising with play dough continuously, involvement in in-hand manipulation activities, holding the pencil with a tripod grasp, coloring an entire picture, writing their name, tracing on a line with control, copying numbers 1-5, copying simple pictures using geometric shapes, independently attempting to draw a range of pictures, and cutting out simple shapes) in pre-primary 1 were statistically significant to fine motor proficiency at 62.4% level. The results indicated that fine motor proficiency has an effect on pre-primary 1 learner's pen-handling where those competent in fine motor are proficient in pen-handling. From the scatter graph, the data indicated an uphill pattern which unveiled a positive relationship between fine motor proficiency and pen-handling. This implied that with increase in fine motor proficiency, there was an increase in pen-handling hence fine motor proficiency has an effect on pen-handling among pre-primary 1 learners in Kakamega East sub-county, Kakamega County, Kenya.

These findings concurred with those from the interview schedules and observation checklists where teachers explained that frequent participation in fine motor improves learners writing outcomes. Also, teachers stated that 'those learners whose parents offer fine motor materials tend to have good handwriting as compared to those who are not'. The document analysis results indicated that majority of the preschools have relevant fine motor materials which means that learners are exposed to fine motor which improves their pen-handling. These findings are in line with Breuhl (2020) who studied on the mean duration of children's involvement with fine motor resources within the classroom during free play as well as the effect of direct mediation with fine motor exercises which enhance grip and pinch influence. He did this to find out if the two would affect learners writing performance. The results indicated that a post-intervention handwriting facilitated learner's improvement in name writing performance. This means that fine motor proficiency has an effect on learners' pen-handling.

IX. Recommendations

The linear regression analysis results showed that the selected pen-handling variables (exercising with play dough continuously, involvement in in-hand manipulation activities, holding the pencil with a tripod grasp, coloring an entire picture, writing their name, tracing on a line with control, copying numbers 1-5, copying simple pictures using geometric shapes, independently attempting to draw a range of pictures, and cutting out simple shapes) were statistically significant with fine motor proficiency at 62.4% level. It therefore recommended capacity building for preschool teachers to equip them with relevant fine motor skills that will help in improving learner's writing outcomes in Kakamega East sub county, Kakamega County, Kenya.

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