FINE MOTOR PROFICIENCY AS A PREDICTOR OF EARLY WRITING OUTCOMES AMONG PRE-PRIMARY 1 LEARNERS IN KAKAMEGA EAST SUB COUNTY, KAKAMEGA COUNTY, KENYA

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A Thesis Submitted to the Department of Educational Psychology, school of education in Partial Fulfilment of the Requirements of Masters of Education Degree in Early Childhood of Masinde Muliro University of Science and Technology (MMUST)

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DECLARATION

This thesis is my original work prepared with no other than the indicated sources and support and has not been presented elsewhere for a degree or any other award

Signature..... Date.....

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology a thesis entitled: "**Fine Motor Proficiency as a Predictor of Early Writing Outcomes among Pre-Primary 1 learners in Kakamega East sub-county, Kakamega County, Kenya.''**

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DEDICATION

This work is dedicated to my daughter, Blessing Hope, for her supportive enrichment nature to this study.

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ABSTRACT

Readiness to learn is beneficial to pre-school learners as it entails specific skills acquisition such as intellectual, social, and motor skills required for learning and they are also connected to later academic outcomes and school completion. Fine motor proficiency (fluency in use of finger muscles) not only facilitates proper handwriting, better coordination of small muscles in movement with the eyes, hand and fingers but also manipulating writing and play tools (Arango 2001). Children who miss this kind of stimulation manifest behavioural, socialization, and cognitive difficulties which affects their later academic outcomes (Goodness 7 Sianesi 2005). The fact that there have been studies on numeracy and literacy skills in general, there hasn't been any studies on writing as a single component which means that writing should be looked into since it is the basis of learning. Thus, this study examined the influence of fine motor proficiency on writing development among pre-primary 1 learners in Kakamega East sub-county, Kakamega county, Kenya. The study objectives were to establish the influence of fine motor competency on pen-handling, the impact of fine motor expertise on legible writing, and the association between fine motor competency and letter formation among pre-primary 1 learners in Kakamega East sub-county. The study utilised Prior's sociocultural which addressed the writing components and Kephart's theory which dealt with fine muscle development and the exercises that improve the same due to insufficiency of a single theory in outlining both fine motor and writing outcomes. The research utilized a survey research design as a mechanism of identifying the association between the dependent and independent variables. The tools used for the study were questionnaires, interview schedules, observation checklist, and document analysis guide. The study's target population was 6 public preschools where 6 ECDE head teachers were sampled using purposive technique with three hundred and eighty-five parents who were proportionately sampled. In order to test for the research protocol, piloting of the research tools was done where content validity was utilized to test for the validity of the instruments. Scientific testing of the research tools using the test-retest method was done with experts from Masinde Muliro University of Science and Technology (MMUST) to establish the feasibility of the study tools at r=0.7. Data was analysed in words, descriptively and inferentially using means, their percentages and linear regression analysis supported by Package for Social Sciences (SSPS). In determining the association between the dependent and independent variables, linear regression analysis and Anova test were used. Also, Pearson correlation was used in hypothesis testing. The regression analysis results indicated that pen-handling, writing legibility and letter formation are significant in explaining variations in fine motor proficiency among pre-primary 1 learners. The results were supported with interview, observation, and document analysis guide. The study findings indicated a strong positive linear relationship shown by the gradient of the equation ranging from 0.1- 0.5. The study concluded that fine motor proficiency has an effect on pre-primary 1 learners writing outcomes. The study recommended the county government of Kakamega to organize trainings and seminars to equip preschool teachers with relevant skills to enhance learners writing outcomes.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACT	American College Testing Program.
ARNEC	Asia-Pacific Regional Network for Early Childhood.
BOTP	Bruinins-Oseretsky Test of Motor Proficiency.
C.R.F	Cardio Respiratory Fitness.
CCCH	Centre for Community Child Health
CCSS	Common Core State Standards.
CDSP	Child Development Services Program.
ECCD	Early Childhood Curriculum Development.
ECD	Early Childhood Development.
ECDE	Early Childhood Development and Education.
ECERS-R	Early Childhood Environmental Rating Scale-Revised.
EYE	Early Years Education.
FMS	Fine Motor Skills.
GMS	Gross Motor Skills.
IECDB	Initiative for Early Childhood Development Building.
IQ	Intelligence Quotient.
KICD	Kenya Institute of Curriculum Development.
KSRAT	Kenya School Readiness Assessment Tool
MABC-2	Movement Assessment Battery for Children -2.

MoE	Ministry of Education.
MoEST	Ministry of Education, Science and Technology.
NACOSTI	National Council for Science and Technology Institute.
NAEYC	National Association for the Education of Young Children.
NELP	National Early Literacy Panel.
NRP	National Reading Panel.
OECD	Organization for Economic Cooperation and Development.
P.A	Physical Activities.
P.E	Physical Education.
PISA	Program for International Student Assessment
SDG	Sustainable Development Goals.
SES	Socio Economic Status.
SPSS	Statistical Package for Social Sciences.
TGMD-2	Test of Gross Motor Development-2.
UNCRC	United Nations Convention on the Rights of the Child.
UNGA	United Nations General Assembly.
UNICE	United Nations Children's Fund.
WHO	World Health Organization.

CHAPTER ONE

1.1 Introduction

This chapter reviewed the background of the study, statement of the problem, purpose of the study, the objectives and the research questions. It also talked about the research hypothesis, significance of the study, scope of the study, limitations of the study, the assumptions, the theoretical and conceptual frameworks and the operational definition of terms.

1.2 Background of the Study

Early Years of Education of good quality is critical in development of school readiness skills (academic and non-academic skills) and in determining future learning outcomes and general life success (Yamin & Sanan, 2019). Early years of education is meant to ensure lifelong learning through early stimulation which increases the duration of schooling and school performance. According to the 2030 Sustainable Development Goals, early childhood development offers a natural link to other goals of education. In this case, children should be prepared for learning readiness because it is during this period when preschool children begin building their motor and literacy skills through physical, social, emotional, cognitive, and language developments through teachers' support and monitoring. According to Dockett et al. (2010), the essential aspects of school readiness are well coordinated through the physical and health of children.

Readiness to learn is beneficial to pre-school learners as it entails specific skills acquisition such as intellectual, social, and motor skills required for learning and they are also connected to later academic outcomes and school completion. Particularly, pre-school learning readiness is the ability of the learner to successfully and smoothly transit into the pre-school

learning setup, be in a position to meet its expectations, and adhere to the established routines for them to achieve learning competency skills (World Bank, 2016). A study done on benefits of Early Childhood Education (ECE) by Organization for Economic Cooperation and Development (OECD) & Glewe (2013) established that learners who attended pre-school performed better in learning competencies than those who did not attend any form of preschool education. Also, nations with good education structure stand better indicators on developments such as reduced mortality levels, lower population growth, reduced crime later in life, and improved health status. UNESCO (2010) stated that children who engage in high quality early childhood education activities demonstrate gains in educational, social, intellectual, and health development.

In line with this, the National Association for the Education of Young Children (NAEYC) (2009), argued that early years of education supports children's school readiness in areas such as motor skills, socialization skills, self-care skills, and emotional skills (Oktay & Unuktan, 2005). Teachers are therefore called upon to strive to ensure that preschool children are being involved in these activities as a way of improving their fine motor skills in preparation for proper writing. NAEYC (2009) stresses on the need of acknowledging positive associations and supportive association as the building blocks of working with young children, knowledge and comprehension of appropriate practices and tools for early education, the use of a broad repertoire of developmentally appropriate teaching/learning approaches, as well as reflecting on practices that promote positive outcomes to all young learners and families where there must be early intervention efforts to support children who may be at risk for later school failure. These efforts are most efficient when they provide comprehensive services rather than simply addressing specific skills (Oktay & Unuktan 2015).

In line with UNICEF (2012), the early intervention efforts can be made possible through the Early Years of Education which offers children opportunities to participate in academic life as well as families, the surrounding settings and communities expected prior skills, knowledge, and chances for an effective adaptation process. The No Child Left Behind agenda by the United States supports this by promoting the idea of early literacy through the Early Reading First initiative and emphasizing on reading, language arts, and mathematics (Blair 2015). In developing school readiness skills during the early years of learning, young children are introduced to instructions that support their cognitive, social, and physical development which leads to demonstration of basic literacy, numeracy, and motor skills used in learning, appropriate communication, and exploring the immediate environment and application of digital literacy for learning and enjoyment (Arango 2001).

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). According to the U.S Department of Education (2014), quality early year education helps in ensuring that children in preschools and other learning setups have the privilege of meeting academic experiences and standards. In line with this, high quality early learning experiences for children such as interpersonal interactions, good and adequate play environment, professional and stable teacher workforce, program support structure, multilevel continuous quality improvement system tend to prepare them to be academically ready for success and age-appropriate curriculum (Hughes, 2010).

Similarly, the Community Child Health Centre (2008) argued that children's exposure to quality instruction and appropriate associations are well prepared to receive continuous

instruction than those who have not been subjected to qualities associated with early childhood teaching. According to Blair (2002), children exposed to quality early stimulation emerge as better readers and proficient writers and this later facilitates their smooth settling in different grades and in school. Such children develop better attitude, become competent in working with numbers, colours, shapes and they experience early maturity of their fine motor skill (or dexterity).

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). As a result, there is need to focus on the particular areas that are important in making children ready for school such as positive parental and caregiver involvement and attitudes in learner's early instruction, development and transition to school. Ready children should be acquainted with what they should know and do to enter school with eagerness to learn which enables successful transition to preschool and as well as to an elementary school setting. Also, schools must offer environments and activities that enhance and support safe transition as well as foster the learning of all children (UNICEF 2012).

Equally recognized is that children's holistic development encompasses an association between the mind, body, and spirit which works together paying attention to children's social, emotional, physical, personal, and spiritual wellbeing and the intellectual aspects of instruction which include writing and reading skills. It has been confirmed that these skills prepare children for primary education (Kocak, 2018). Also, skill development incorporates spatial association, shape-ground separation and the hand-eye coordination. Motor development plays an important role to develop these competencies. The building blocks of

motor skills are therefore developed through learning of fine motor skills, eye-hand coordination, and shoulder girdle strength (Dere, 2019).

Fine motor proficiency (fluency in use of finger muscles) not only facilitates proper handwriting, better coordination of small muscles in movement with the eyes, hand and fingers but also in manipulating writing and play tools (Arango 2001). Children who miss this kind of stimulation manifest behavioural, socialization, and cognitive difficulties which affects their later academic outcomes (Goodness & Sianesi 2005). Children aged 4–5-year-olds are likely to develop fine motor proficiency and proper development of writing skill, when preschool teachers involve them in a variety of manipulative and creative activities, within a context having plenty of resources that promote development of these skills. this is because children's development occurs in stages and it must be supported by adequate fine motor skill activities such as colouring, drawing, tracing, pasting, paper cutting, moulding, scribbling on sand and papers, catching and throwing activities among others (Gottdchling-Lang 2013).

At 4-5 years, most children are able to show fine motor proficiency when they hold/grasp a pencil with a tripod stand, shape/form letters appropriately, cut and paste, sort and order, arrange blocks, trace and colour within margins, mould and also write legible letters. Pre-primary 1 learners with well-developed and flexible fine muscles tend to have proper pencil grasp which leads to proper pen-handling; a situation where one is able to hold the pen upright and appropriate while writing. They also have proper writing legibility whereby their letters can be easily read and they also develop proper letter formation since they correctly and accurately shape their letters when writing as compared to learners who are poor in fine motor proficient.

This is in line with Pienaar's (2004) argument that many learning activities in preschools are aimed at preparing children to become fluent with letters and numbers because literacy encompasses children's experiences with books and reading including nascent knowledge of how print works like letter knowledge, conventions of reading, emergent writing and awareness of the sounds in language. This suggests that fine motor and emergent literacy skills including emergent writing are distinctly related. Moreover, the acquisition of competency in literacy involves recognition and reproducing visual representations of higher order concepts.

Fine motor skills and writing are important in early life and the teacher must incorporate various strategies to promote development of these skills. Keifer (2015) indicated that interventions tailored towards development of fine motor skills are also necessary in handwriting skills. According to him, these strategies include tracing dotted line, using a pinch type cloth pin to pick up cotton ball, using a single hole punch, cutting with scissors, peeling stickers, stringing beads, moulding clay and weaving yarn. Barhost & Twisk (2013) assessed for the link between fine motor experiences and writing and they found out that both were connected to success in math and reading although writing ability was a stronger predictor. Their findings indicated a strong relationship between early school success in crucial school subjects such as writing outcomes including pen-handling, writing legibility and letter formation, math and motor proficiency.

Equally, fine motor and emergent literacy skills such as emergent writing are distinctly related where the design copying aspect of fine motor skills is positively related with written expression and name writing. This is because emergent literacy involves children's experiences with books and reading, including the knowledge of print works and awareness

of the sounds in language. In this case, children are in a better position of acquiring competency in writing literacy which involves recognizing and eventually reproducing visual representations of higher order concepts. Also, fine motor activities may offer children the opportunity to practice mapping visual representations to concepts such as drawing letters with makers, crayons, or pencils, colouring and painting which makes their hand and finger muscles flexible enough for good writing skills. This is the reason why some children have good handwriting due to their fine motor proficiency whereas others have poor writing skills because their fine muscles are not flexible to enable them write properly (Piennar et al 2014).

According to Akin (2019), components like visible knowledge display a slight relationship with writing while visual devices, motor arrangement and tactile kinaesthetic are more closely associated with letters. Motor coordination is also important in motor planning, intellectual and perceptual skills, visual-motor coordination abilities, and a mix of tactile and kinaesthetic sensitivities which are complex perceptual-motor skills. Fine motor skills are used in letter formation because they direct the force and appropriate scheduling of interrelated finger, hand and arm movement. Motor coordination helps in coordination of preparation skills to form letters such as development of large and small muscles, fine motor skills, hand-manipulation, manual coordination and visual perception (Akin 2019). Fine motor skills are important in writing since they assist in forming accurate numbers and letters that can only be facilitated by appropriate force control and timing of coordinated hand, arm and finger movement. Pienaar et al. (2007) reported a well-coordinated association between reading, math, motor proficiency and writing performance in girls and boys in disadvantaged South African learners where children with lower motor proficiency had poor performance in these academic areas. Visual-motor development and hand strength can directly affect writing and is found to be more difficult in children from low socioeconomic (SES) backgrounds.

The Kenyan Early Years Education curriculum is designed in a way that it allows indoor and outdoor play for development of gross and fine motor skills. 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 activities should be developmentally appropriate and supportive of motor skill development. Through the unstructured play, the teacher can provide activity supportive movable materials, riding vehicles that improve fine motor skills development and manipulative objects (Nicaise, Kahan & Sallis 2011).

As a result of the structured and unstructured play, it is recommended that children should be allowed to give ideas on what type of play activities they want to engage in like kicking, throwing, moulding, and roll playing using hand palms with fingers slightly curled towards the palm. Children should be allowed to tear newspapers into strips same as puppets, art projects or scarecrows. Sewing activities such as making artistic designs on paper, use of eye droppers in picking up coloured water for colour mixing and stringing beads can be applied to improve fine motor skills (Pienaar et al 2014). According to the foundation of Competency Based Curriculum (CBC), active learning includes learning through play, use of the five senses, application of Maths, strengthening communicative competence through dialogue, group discussions, debate, reading for pleasure, writing and performing dramatic plays. This is based on ideas of great thinkers which include archery, the art of using bows and arrows, swordsmanship and martial arts, the art of handwriting and maths.

Unfortunately, in most preschool classrooms, the issue of lack of resources and teachers' tendency to rush children into academic and reading mainly through rote memory (cramming) with less on writing development has been a concern. Equally, there is poor parental attitude towards play as a messy, dirty and time-consuming activity renders most preschool learners proficient. Many teachers don't focus on activities that promote fine motor to enhance proper writing which becomes a challenge for the learners to write properly. Most of the teachers ignore pre-writing skills as they often rush learners into writing without intensive practices in activities such as colouring, cutting, pasting, tracing, joining dots among others.

1.3: Statement of the Problem

Even though, pre-literacy development, that is, emergent reading and writing have been recognized as critical academic skills that predict academic trajectory and school success of all learners, poor literacy outcomes among preschool and school age children in Kenya still persists. According to the three most recent national literacy survey conducted in Kenya (NASMLA 2005; KNEC, 2010; Uwezo Report of 2016), Western region ranks lower in literacy outcomes as compared to other regions. Specifically, Uwezo statistics established that a significant 17.6% of learners who were assessed in grade 2 and 3 who were unable to identify letters. Even when the above national surveys recognize that literacy and numeracy is highly dependent on children ability to write, its not clear to a number of Early Childhood educators on the importance of writing development and prewriting as a school readiness skill. Equally, more concerns continue to be raised about: teachers' inability to plan and

execute play-based learning as well as poor parents' attitudes (messy, chaotic and time wasting) towards play in classrooms in Kenya.

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 skill. According to Pienaar et al (2014), the issue of lack of manipulative and creative materials in preschool for fine motor activities that promote writing such as cutting, and drawing and the view of parents and teachers that the use of locally available resources such as clay makes their children dirty makes teachers ignore fine motor activities which is an important domain of child development. As it is, it not only remains unclear whether 4–5-year-old in Kenya and specifically in Kakamega county, are proficient enough in their fine motor and how well this is able to predict emergent writing outcomes given that most of the learners are not appropriately exposed to activities of fostering the same. Thus, this study examined the influence of fine motor proficiency on writing development among pre-primary 1 learners in Kakamega East sub county, Kakamega county, Kenya.

1.4 Purpose of the Study

The purpose of this study was to examine fine motor proficiency as a predictor of writing outcomes among pre-primary 1learners in Kakamega East sub-county, Kakamega County, Kenya.

1.5 Objectives of the Study

1. To establish the effect of fine motor proficiency on pen-handling among pre-primary 1 learners in Kakamega East Sub- County, Kakamega county, Kenya.
2. To establish the effect of fine motor proficiency on writing legibility among pre-primary 1 learners in Kakamega East sub-county, Kakamega County, Kenya.
3. To determine the relationship between fine motor proficiency and letter formation among pre-primary 1 learners in Kakamega East sub-county.

1.6 Research Hypothesis

H_1There is no significant relationship between fine motor proficiency and pen-handling among pre-primary 1 learners in Kakamega East sub-county, Kakamega County, Kenya.

H_2There is no significant relationship between fine motor proficiency and writing legibility among pre-primary 1 learners in Kakamega East sub-county, Kakamega County, Kenya.

H_3There is no significant relationship between fine motor proficiency and letter formation among pre-primary 1 learners in Kakamega East sub-county, Kakamega County, Kenya.

1.7 Significance of the Study

This research intended to determine fine motor proficiency as a predictor of writing outcomes among pre-primary 1 learners in Kakamega East sub-county, Kenya. The study findings may benefit the management of public pre-school centres in Kakamega East sub-county who will gain an insight on how to incorporate fine motor skill activities in their studies so as to enhance writing outcomes of the learners. This study may help teachers in identification of structured and unstructured play activities which are necessary in promotion of fine motor

skills used to help in the shaping of writing outcomes. As a result, the study will enhance the development of fine motor and finger dexterity hence the improvement of handwriting.

The study findings may help the government and other organizations to design a curriculum that will help in incorporating fine motor skill activities in learning of preschool children. The study may form a basis to explore factors that affect teacher's involvement in motor skill activities which in turn affects learners' academic achievement. The study findings may be of help to the decision implementers in the Education sector to come up with policies that will prioritize and give emphasis on the vitality of physical activities for the pre-primary 1 learners. This may therefore enable the ECDE curriculum programmers to include hours of programmed physical activities; both indoor and outdoor activities. As a result, when the pre-school teachers implement the policies, the pre-primary 1 learners may have an opportunity to develop their fine skills which are important in the expansion of writing outcomes in the learner's early years. The aftermath may be pre-primary 1 learners who are competent in writing which will contribute to their later academic achievements in primary schools and onwards.

1.8 Scope of the Study

This research was carried out in Kakamega East Sub County, Kakamega County among 385 parents and 6 teachers-in-charge. Fine motor skills and writing skills was of particular focus leaving out reading which are also very important in promoting children readiness. This is because most of the pre-primary 1learners in the sub county have limited writing and communication skills. The study had fine motor proficiency as an independent variable and pen-handling, writing legibility, and letter formation as dependent variables. The study focused on pre-primary 1 learners who displayed their writing outcomes in relation to fine

motor skills, teachers-in-charge who talked about learners and teacher characteristics. It also focused on pre-school teachers-in charge because they had an upper hand and first-hand information concerning their learners and the motor skills competence as well as their capability to write effectively which was accredited to the learners' competence in fine motor skills. Parents gave information on learners pre-writing skills, fine motor and writing skills at school and home. Public preschools and teachers-in-charge were purposively sampled while parents were proportionately sampled. The study utilised interview schedules for the teachers-in-charge, document analysis guide, parent's questionary, and observation checklists to gather information from the study population which comprised of; 6 teachers-in-charge and 385 parents.

1.9 Study Limitations

This study was addressing an issue of national significance but it was limited specifically to Kakamega East sub-county. The participants and ECDE centres were limited and located within Kakamega East sub-county although the researcher used this sample to reflect the face of the nation, thus the findings may be used for national representation. The attitude of respondents would have affected the validity of the results or would have failed to give accurate readings of what was being investigated however; the researcher conducted the civic education prior to the study and only those who accepted to respond to the study questions were used as the respondents. Moreover, the researcher did cleaning of data and discarded incomplete questionnaires and also observation schedules were used to beef up data from the questionnaires. Demands of the respondents in the samples due to job responsibilities were considered a limitation to the study hence influencing their ability to provide accurate

responses but the researcher rescheduled to conduct the study early in the morning before the official classes and in the afternoon just after the official classes.

There is a limitation in establishing how ready is the fine motor dexterity for proper handwriting since there is no locally relevant tool to ascertain the efficiency of fine motor. The study was limited in establishing how ready is the fine motor for writing since there is no tool to ascertain the same. The pre-primary 1 learners could not fill the questionnaires on their own hence the use of parents to give data on learner's fine motor proficiency and writing outcomes was a limitation. However, it was mitigated by the use of observation schedules by the researcher.

1.10 Assumptions of the Study

The researcher assumed that all the respondents would cooperate hence gave reliable and valid responses. All the ECDE learners in the county were exposed to the same curriculum, all the preschool teachers-in-charge sampled were familiar with the KICD syllabus and accessed it easily and they used it in their work. All the ECDE centres were under management of the County Government of Kakamega so it was believed that the findings would benefit the leadership of the county in the education of pre-school learners. All the pre-primary 1 learners were of good, normal physical and mental health and they were of the same or approximately the same age. All the preschools exposed the learners to the same curriculum in the same way.

1.11 Theoretical Frameworks

This study was guided by Prior's (2006) writing sociocultural and Kephart's & Roach's (1966) visual appliance development theories. Sociocultural theory of writing expounded on features, skills, and activities of writing outcomes while Kephart's visual motor theory addressed the issues, skills, and activities of fine motor proficiency hence when combined together, the two theories outlined the link between fine motor expertise and writing outcomes among learners.

1.11.1 Sociocultural Theory of Writing

According to Prior (2006), sociocultural theory stipulated that activity is encompassed in tangible associations that are locally improvised monitored by historically provided equipment and activities ranging from objects, institutions and machines to structured environment. This means that for writing to take place, children must exercise with their experiences through diversified practices such as manipulation of objects situated within their surroundings. Mediated practices encompass manipulation, construction of devices and objects and co-action with other individuals and components of the sociomaterial settings as well as perception and learning. According to the sociocultural theory of writing development, writing involves a dialogic process of invention which implies that writing does not occur in a spur of a moment rather it is done through processes. This theory fits the study variables; pen-handling, writing legibility and letter formation which are writing components and for one to have a good handwriting, they must be well trained.

1.11.2 Kephart's Theory of Motor Development (Visual Motor Theory)

Kephart and Roach (1966) have provided a Comprehensive Perceptual Theory of Motor Learning. For Kephart, all behaviour is basically motor and perception must be matched with

a motor pattern to have a meaning. According to him, postural adjustments and movement patterns are displayed as the foundation for the growth of body image, which is prerequisite for the development of direction and laterality concepts. By manipulating objects in relation to himself, developing children perfects the matching of motor data and sensory. Children learn general forms of responding which Kephart describes as adaptive, selective and flexible through which laterality and direction are formed through matching kinaesthetic and visual clues. This means that a child develops fine motor proficiency which is critical in writing development. The theory assumes that development of most behaviour arises from a hierarchy of motor achievements thus the motoric responses to a child's environment is the central core to all behaviour. In this theory, Kephart attaches less significance to senses other than vision where the theory is viewed as a visual-motor rather than a perceptual-motor one.

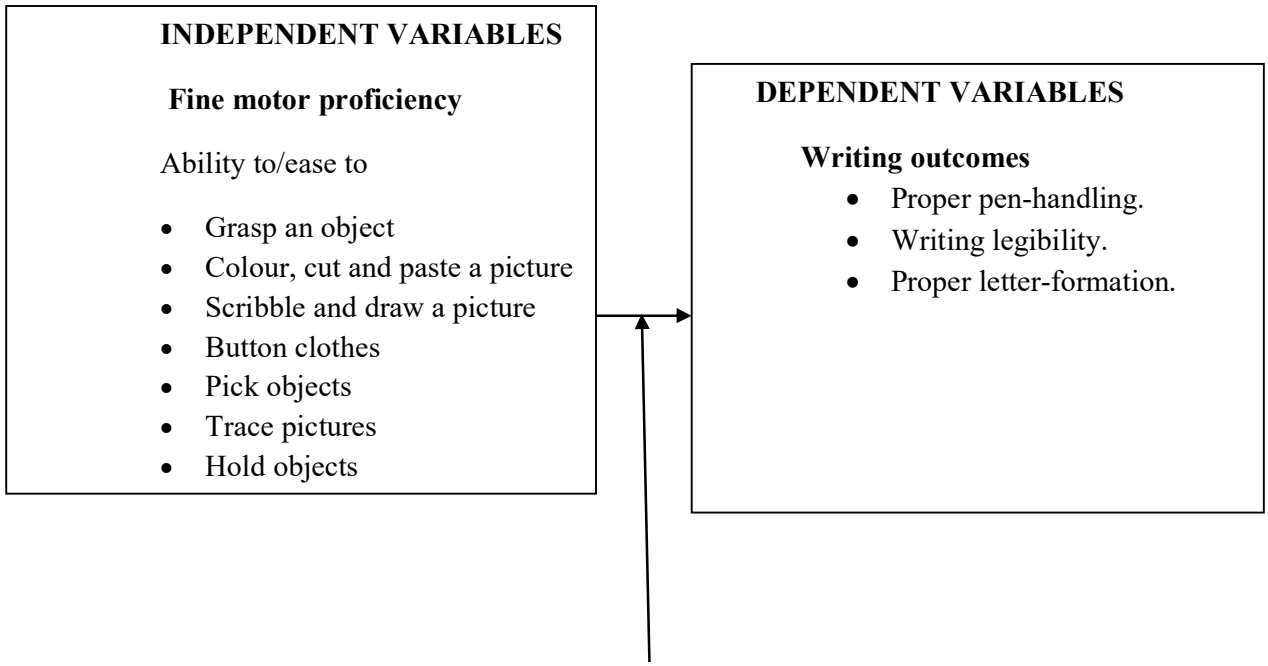
Kephart's theory state that the ability to use both motor skills and visual sense helps in task completion. It also states that motor movements and eyes co-work in an efficient manner. Therefore, visual perceptual and large muscle competencies are necessary for efficient visual-motor enlargement. This implies that for efficient writing to take place, learners' motor skills must be well coordinated together with the perceptual skills. Kephart asserts efficient motor output relies on the appropriateness of the integrative pattern that controls the output and the effectiveness of the feedback (Calder 1970). Hence, the development of normal movement patterns gets affected if there is inadequacy in either of the above. This means that with adequate fine motor proficiency, there is normal development of writing outcomes (pen-handling, writing legibility, and letter formation) but in the absence of fine motor skills, there are poor writing outcomes among the learners. Also, when there is damage to the perceptual-motor systems that affect the systems controlling motor activity, the motor equipment may be destroyed which might predetermine the state of the development of the present movement

patterns. Moreover, the tangible destructions initiated by motor defects may further prevent the growth of correct relationships between motor activity and sensations influencing the development of fine motor proficiency among learners. In fact, defects in fine motor skills means writing problems thus the teacher must strive to ensure a balance between the two by avoiding the fine motor defects. In relation to the first theory, this theory outlines the fine motor skill acquisition process and its importance in relation to writing outcomes.

1.12 Conceptual Framework

A conceptual framework encompasses concepts and the study variables. The experimental variable was fine motor proficiency while the quantity variables were pen-handling, writing legibility, and letter formation which were to be demonstrated by learners' ability to write properly under the influence of fine motor skills.

Figure 1.12.1: Conceptual Framework



Intervening Variables

- Gender.
- Frequent school attendance.
- Teacher qualifications, trainings and experience.
- Availability of manipulative materials and activities.
- Quality of parental care.

The study was evaluating smaller muscle competency as a quantifier of writing outcomes through assessment of the impact of fine motor expertise on pen-handling, the influence of fine motor on legible writing as well as the association linking fine motor and formation of letters among learners. When the independent variable (fine motor proficiency) is well coordinated through appropriate activities such as finger dexterity, cutting, colouring, joining dots, tracing, pasting among others, the end result is positive writing outcomes where children are able to write properly through proper pen-handling, writing legibly, as well as proper letter formation during writing hence good handwriting. Children will manifest proper pen-handling with a tripod stand, proper pencil grasp, they will have proper letter formation and their writings will be legible enough to be read easily.

It was anticipated that preschools with well trained and qualified teachers, appropriate facilities and well developed and adhered to curriculum delivery practices and activities have higher pre-primary 1 writing outcomes than those without. However, this would have been impacted by other variables such as the pre-primary 1 learner's characteristics such as gender where at times girls tend to write properly than boys. School attendance may also affect learners writing since those who attend school frequently may develop good handwriting due to exposure to fine motor skills than those who do not. The age of learners may affect writing since learners who are at the right learning age may write properly than those who are still

young. Teachers teaching experience and the level of training may have an impact since those who have attended trainings and seminars on how to teach handwriting may have a positive impact on learners writing outcomes than those who do not have experience and training. Also, home readiness for preschool may impact learners writing readiness since those who are well prepared to join school may settle easily and begin the act of writing while those unprepared to join school may have a hard time settling which may negatively impact their writing outcomes.

Moreover, availability of manipulative materials might enhance learners fine motor proficiency whereas absence of the materials might negatively affect their writing. On the same note, parental control might intervene in pre-primary 1 learners writing. In this case, parents who are in control of their children's' studies tend to offer guidelines and regulations which help them in the development of fine motor skills for appropriate writing outcomes. On the other hand, parents who are not in control of their young one's fine motor proficiency tend to negatively affect them since the children lack parental direction on what to do in terms of fine motor skills while at home which tentatively affects their writing outcomes.

1.13 Operational Definition of Terms

Curriculum: Refers to the academic content comprising of fine motor proficiency and writing outcomes r activities offered in ECDE centres.

Early Childhood Education: Refers to education offered in ECDE before learners transit to grade one.

EYE: Refers to education offered to learners aged eight years and below.

Fine motor proficiency: Refers to fluency in dealing with small muscle coordinated activities such as scribbling, colouring, copying and pasting among others.

Pen-handling: Refers to proper holding of the pencil by a four-year-old child while writing.

Writing legibility: Refers to the proper shaping of letters while writing which results into well written words and sentences.

Letter formation: Refers to the proper forming and shaping of letters while writing.

Fine motor skills: Control of small movements such as reaching and grasping.

Legibility: The ease with which a learner can write symbols.

Proficiency: Competencies that one uses to perform small tasks such as scribbling.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviewed discussions of literature on fine motor skills and its influence on writing outcomes. The researcher focused his review on ECDE and school readiness and the aspect of writing readiness. The researcher also reviewed the influence of fine motor competency on pen-handling and legible writing together with the link of fine motor experiences and letter formation and the summary and identification of research gaps. The purpose of this section was to find the scholarly articles that addressed the issue under investigation with an aim of improving on them or presenting a different dimension after establishing the gap.

2.2 Early Years of Education and School Readiness

Readiness to school refers to children's eagerness to join and participate in school and achieve from early learning activities that enhance academic success. According to Arango (2001), all children have got the right to early years education and primary education. This has been supported by the Initiative for Early Childhood Development Building (IECDB) which argues that early years of education is an important phase of life particularly in the early days since it establishes the foundation for children's future learning, wellbeing and health.

2.2.1 Importance of Early Years of Education

Early year's education is an effort to develop all forms of a child's development through the provision of education to have the eagerness to study at the next level of education (Yamin & Sanan, 2019). It is during this period when preschool children begin building their motor and literacy skills through physical, social, emotional, cognitive, and language development through teachers' support and monitoring. According to Arango (2001), 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 writing. There is a correlation linking fine motor experiences and instructional achievement as seen in a U.S. study where 5-year-old learners with strong fine motor skills performed optimally than their peers with weak fine motor skills in reading and math. Many learning activities in preschools are aimed at enhancing children's fluency with numbers and letters where literacy involves learner's interactions with books (Arango 2001).

Young children's transfer from kindergarten and elementary studies is a sensitive stage in learners' development and should be treated with a lot of care and concerns by the teachers and caregivers. In developing school readiness skills, early childhood programs are good interventions in helping children to transit smoothly to formal schooling. Many teachers have the idea that early writing and reading skills are important precursor to later academic achievement of children in elementary school and beyond. Thus, majority of preschools today have experience in home care environments which vary basing on the classroom setups and day care home programs which are provided universally. Children's emergent literacy skills vary when they join preschool and this may be as a result of programs, they were exposed to prior their entry. In this case, centre-based early childhood learning settings are essential for the growth of children (Pienaar et al 2014).

UNICEF (2012) stipulated that the early intervention efforts can be made possible through the Early Years of Education which offers children opportunities to participate in academic life. The No Child Left Behind agenda by the United States supports this by promoting the idea of early literacy through the Early Reading First initiative and emphasizing on reading, language, arts, and mathematics. In the same vein, the Department of Education in the U.S (2014) confirmed that well-structured years education helps in ensuring that children in preschools and other school programs have the basics of meeting instructional settings and experiences. In line with this, appropriate ECD instructional happenings for children are meant to prepare them to be ready for the academic achievement (Hughes, 2010). According to the Child Health Community Centre (CCCH) (2008), exposure of learners to quality early education through impactful associations make them receive adequate instructional standards than those who are not. Hence from the findings, early years of education has an effect on

learner's fine motor proficiency and writing as they determine how learners will grasp and tackle fine motor and writing related activities.

2.2.2 Effect of Early Years Education on Fine Motor Proficiency and Writing Development

Fine motor expertise is defined as the coordination of small muscles together with the in movements that always incorporate the integration of hands and fingers with the eye. Pre-primary 1 learners are in a position to start using one hand consistently, cutting along a straight line with scissors, cutting long curved lines like a circle, and drawing a cross on their own. They can duplicate squares; initiate scribbling of curved lines like in a triangle and they also begin colouring within the lines of a diagram. These children commence sketching recognizable diagrams, they construct items with tiny connected blocks, start learning to print some capital letters, they can dress on their own although many still need help with fastening their zips and buttons and they also use small knives in cutting soft items.

According to Morin (2014), putty and play-dough helps in enhancing children's fine motor skills and the teacher should permit learners to pinch, roll worms with clay or plasticine, stretch and squeeze. Varied forms of painting can help improve children's manual dexterity and hand-eye coordination because printing with fingers offers a chance for them to get messy through the use of their hands. Playing with sponges help children squeeze out a sponge in water bowl which strengthens their hands and forearms. Gardening and planting are small muscle control in cases of seedlings transfer into farms that need hand-eye coordination expertise to transport the smaller plants to the new hole safely. The grasping of a trowel to uproot and to use a pincer grasp when picking up seeds to plant also improves

children's small muscles. The small muscles are important in letter formation since they assist in pen-handling, writing legibility and formation of accurate numbers and letters that can only be enabled through forced regulation of coordinated arm, hand and finger as well as proper timing. Lust and Donica (2012) executed a pre and post motor mediation with handwriting without Tears-Get Set for School Program to evaluate the link between fundamental motor performance and writing in low SES children enrolled in Head Start. However, unlike the use of Tears-Get Set for school program, the current study involved an assessment test to which an observation checklist was used to establish small muscles expertise and writing outcomes.

Piennar et al. (2014) found out that lack of fine motor skills in children lead to difficulties in writing as they write formless letters and numbers due to uncoordinated arm, finger, and hand movements. These children have poor performance in academic areas and have challenges with hand strength and visual-motor development which affects their writing. Cameron et al. (2016) argued that most of the instructional exercises in kindergarten in centres were meant to prepare children for letters and number fluency. Thus, emergent literacy engages learners' experiences with nascent knowledge of language and print works. Also, fine motor and emergent literacy skills are closely associated in the copying aspect of fine motor skills which is similar with written expression, name writing and math thus acquiring competency in literacy and numeracy which encompasses reproducing visual representations of higher order concepts.

According to McCarrier et al., (2000), children's early writing development is characterised by writing, play and drawing which can be seen as a challenging situation in the whole process of writing development. Physical activities give children a chance of growing and

refining their capabilities onto which they derive their reading and writing skills (McLane & McNamee 1990). In line with McCarrier's study, this study was based on children's writing development characterised by play where the play part involved fine motor skills. As children proceed with primary education, their writing undergoes through transformations and they investigate and experiment with varied types of writing which focuses on the competency, control and mastery of writing (Bissex, 1980).Children might write similar phrases /texts continuously (Dyson 7 Freedman, 1991). Also, through experimentation and investigation conjoined with reading and writing occurrences at school and home, children refine and enhance their old types of writing thus there is emergence of new forms (Kamberelis, 1999). As the types of writing refine in children, their knowledge of audience develops accordingly. This can be seen where their early writing tends to be for particular individuals such as parents whereas the new types of writing originate from the old ones where children use both of them for various purposes (Bissex, 1980).

According to (Feder & Majnemer 2007), although the VMI scores were related with females' handwriting, the scores including the oblique's cross failed to predict handwriting achievement in a group of 101 grade one learners. This implied that the instructor is required to stimulate positive attitude and active involvement of children in writing skills by developing and executing different types of literacy experiences meant to improve learner's writing. These experiences include written and oral exercises obtained through meaningful, authentic manner. According to (Ruiz & Cecilia 2004), some of the literacy activities that are appealing to children as a context in improving writing among children are decorating cards, writing messages and stories and writing using the computer and drawing.

2.3 The Writing Readiness

Writing readiness also referred to as pre-writing skills are important expertise required for learner's maturation before they start the act of writing. According to Kid sese, the pre-writing skills are important in developing children's ability to effectively hold and move a pencil for enhancement of drawing, copying and colouring and for production of legible writing. The underdevelopment of these skills leads to frustration and resistance since the child is not able to keep up in class due to fatigue which hinders production of legible writing resulting in low academic performance and poor self-esteem. According to Kidsese, writing readiness involves the ability to exert force against resistance using the hand and finger strength which permits essential muscle power for controlled pencil movement. It also involves upper body strength, hand vision, bilateral integration, hand eye coordination, crossing the mid-line, object manipulation, visual perception, hand division and hand dominance. In writing readiness, one can identify a child's problem in pre-writing skills when they have problems controlling colouring or writing equipment, have poor endurance for pencil-based exercises, display messy and or slow handwriting, have an awkward pencil grasp and shows a tendency to use their whole hand to manipulate objects rather than just a few fingers,.

According to Mauro (2021), a normally developing 4–5-year-old child should have the following competencies in fine motor skills; dressing and undressing without help, touching the tip of each finger to the thumb, using a fork correctly, cutting out a circle, copying a triangle shape, grasping a pencil correctly, and tying shoelaces. According to Van Hartingsveldt et al (2015) , pre-primary 1 learners are expected to copy and trace lines, copy sounds, imitate X, grasp pencil in writing position, and recognise between a tiny and big and curve or line. Seemingly, these skills are significant since they are related to how one learns

to complete math skills and intellectual thinking (Grassers, Grimm, Ayer, Murrah, and Steele 2010). Fine motor skills may also have a role in cognitive and language development and they are connected to handwriting development where they are linked with in-hand manipulation skills and handwriting legibility (Greutman 2020).

In order to improve writing readiness skills of pre-primary 1 learners, the teacher must identify and reinforce the frequently used hand in task performance, stimulate involvement in exercises that involve manipulating and grasping of small objects such as practicing tasks that apply to one or two fingers, drawing and stimulate children to indulge in persistent fine motor exercises in case of difficulties when partaking an activity. Experimenting with exercises that involve hand eye coordination like throwing and catching and engaging children in play activities that develop upper limb strength such as wheelbarrow walking and climbing ladders According to Kinedu (2018), activities that enhance writing readiness are lacing with different laces, threading, writing on a vertical surface or drawing, prewriting shapes and daily activities that require finger strength such as opening containers. If left unattended to, learners' writing readiness can have problems with meeting expected academic criteria due to difficulty mastering and number formation, rapid fatigue caused by poor pencil skills, and there would be difficulties keeping up in class due to excessive anxiety and pressure in school-aged children. Moreover, when they compare their abilities with their friends, children may have low self-esteem due to their difficulty in manipulating learning construction items. Learning readiness can also be affected by technology an example being the use of computers and tablets by children at a tender age which results in their dependence on the use of the gadgets. Therefore, this study addressed the effect of fine motor proficiency on pre-primary 1 learners writing outcomes (pen-handling, writing legibility and letter formation).

2.4 The Effect of Fine Motor Proficiency on Pen-Handling among Pre-Primary 1 Learners

Fine motor proficiency is an important element of various daily living activities such as playing, feeding, dressing and writing among others. On the other hand, pen-handling refers to correct 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. According to the Journal of Child and Adolescent Behaviour (2015), fine motor proficiency is significant in the overall motor development during early childhood and is considered as the foundation of more complicated movement skills. Hence, this study focused on the influence of dexterity competence as a writing outcome forecast. Motor proficiency development takes place between two and seven years which is a critical age however, the ideal age for this development is four to five years. Active involvement in physical activities requires children who are more competent in small muscles expertise and advanced sports skills. Also, young ones with insufficient motor experiences might have a difficult moment relating with their friends hence they fail to indulge in play activities. This is because soccer and play game becomes more composite with age where underlying movements are needed for one to take part. Moreover, maintenance of health-related fitness throughout adolescence and adulthood requires physically active young ones.

Children should progress in their motor proficiency for them to grow out of motor difficulties. Otherwise, their physical fitness, activity and motor skills might diminish as they approach adolescence implying that absence of fine motor proficiency may negatively affect children's association with peers as well as their involvement in physical activity in future. For example, Thompson et al. (2016) found that children with movement difficulties had

problems with skill development, social interaction and the general health. Therefore, dexterity expertise information can be used to determine the presence of developmental delay in preschool children and individuals with disabilities. A plethora of research in the past decade has demonstrated that children who are impoverished display major setback in large muscle experiences such as object-control and locomotor skills. An example is a study done by Goodway et al., (2007) which assessed large muscle expertise using the Test of Gross Motor Development-2 (TGMD-2) with 469 disadvantaged Hispanic and African American pre-schoolers in the Midwest and Southwest. The findings showed that a majority of the pre-schoolers scored between the 10th and 17th percentile for locomotor skills and the 16th percentile for object-control skills. In addition, Pope et al., (2018) assessed object-control skills in 111 Hispanic children enrolled in a Head Start program using TGMD-2 and found 83% of the preschool-aged children scored in the poor performance category, which was below 25th percentile. Similar findings of the motor proficiency delays in object and locomotor skills have been noted in intervention studies with preschool children prior to the intervention. Hence, both gross and fine motor skills are important. However rather than the gross motor skills, this study focused on fine motor skills and its importance on learner's pen-handling as a writing outcome. Also, the study had 385 parents as respondents who aided in getting information on pre-primary 1 learners fine motor proficiency and writing outcomes.

In writing, the small finger muscles are important since they help in forming accurate numbers and letters through proper coordination of arm, hand, and finger movement and proper timing. A greater association between reading, numeracy and literacy production and motor skilfulness in girls and boys in South Africa was reported by Pienaar et al., (2014). The report indicated that children who had poor performance in academic subjects had lower motor proficiency. Moreover, visual-motor development and hand strength was found to be

more challenging as it could directly affect writing in children from low socioeconomic (SES) backgrounds. Lust and Donica implemented a pre and post motor intervention with handwriting without Tears-Get Set for School Program to evaluate the relationship between handwriting and fundamental motor performance in low SES children enrolled in Head Start. They found significant improvements in handwriting readiness skills for children in low SES after the intervention. Their finding suggested that handwriting curriculum in conjunction with fine motor training can significantly improve Head Start children's academic performance and school readiness. Furthermore, Piek et al., (2006) reported that fine motor ability could be predicted by socioeconomic status because children who attended Head Start were found to have significantly lower fine motor skills in kindergarten than children who did not attend Head Start. This suggested that Head Start children with delayed fine motor skills may be less prepared for kindergarten.

Children in Head Start spent 37% of their day learning fine motor activities while kindergarten children spent 46% with 42% being pencil and paper activities. This shows that fine motor skills in kindergarten are much more utilized and children in Head Start are not adequately prepared for the work demands required in kindergarten. It is important to assess young children's fine motor skill performance because research has shown that a strong positive relationship exists between fine motor skills and academic success. This therefore implies that there is a positive association between fine motor proficiency and writing development. That is, children who perform better in fine motor skills tend to be more successful academically than those children who do not. Many studies use TGMD-2 to assess gross motor skills in preschool children while Movement Assessment Battery for Children-2 (MABC-2) assesses fine motor skills in three different categories including manual dexterity, aiming and catching, and balance. However, this study applied questionnaires, observation

checklists, document analysis guide, and interview schedules to assess fine motor expertise and writing outcomes of pre-primary 1 learners.

Similarly, Smits-Engelsman et al., (2001) conducted a study in a dependable test to investigate motor performance in three-year-old children. The study revealed that MABC-2, fine motor skills can be measured and applied in determining motor skill deficiencies in children and is essential for discriminating amongst preschool children with motor defects. The MABC-2 can also assist teachers in developing early interventions to be incorporated in sports and play activities of children with motor defects. Nationally, efforts to impact on practices, guidelines and policies of physical activity programs have been established. However, few comprehensive studies on the developmental delays in fine motor skills with the Head Start children have been noted.

A study done on the enrolment of Head Start children showed that these learners would show motor delays and they performed poorly when compared to developing children. From the findings, it was concluded that fine motor skill proficiency is an important element in daily living activities where inadequacy in fine motor affects learner's academic outcomes. According to a study carried out on the level of fine motor skills in Irish children, analysis of those who completed the 2nd Edition motor proficiency test unveiled that only 2nd grade learners met the anticipated measures of fine motor skill proficiency. It was also established that fine motor skill proficiency was not progressing at the required rate given by normative data despite children's raw scores improving with age. As a result, this study focused on fine motor proficiency of the pre-primary 1 learners based on Likert scale's rating and what they are expected to do as per their age level. The small finger muscles might as well demonstrate a significant function in prediction of writing skill development in pre-primary 1 learners

however; no studies have been done on the same since most studies have focused on fine motor skills and the general academic outcomes. This implies that there was a problem in terms of fine motor skills and writing outcomes which must be identified as a means of establishing the determinant of writing outcomes through fine motor proficiency.

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 fingertip

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. 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. 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); Cadoret (2018); 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 writing outcomes in this case pen-handling. 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 (Cameron et al. 2016; van proficiency on pen-handling. In a recent study by True et al (2017 p. 751), they established that by giving learners enough duration in play areas, directed play exercises and by enlarging existing outdoor playground area whenever possible together with the environmental predictors of large and small motor development in preschools may be able to improve motor competence Also in pen-handling, learners must be provided with activities that foster the same such as exercising with play dough which helps in building a flexible thumb IP joint which is essential for a pencil grasp. According to Sara B (2019), children can

be provided with craft stick tweezers which helps in developing a habit of holding a pencil, putting ball bearing in box and separating according to different colours or shapes using tweezers. Children can play with elastic bands by putting two elastic bands of same size around children thumb, index finger, and middle finger which helps learners to develop muscles which further helps them in making space while writing. Beads can be used to help develop eye-hand coordination in children and also, the use of doodle board helps learners practice different letters and patterns without committing them on a paper.

In-hand manipulation helps in building skills needed by learners while manipulating pencils for the formation of different letters. Also, playing with clay develops muscles in children building strength needed for holding a pencil where stencils help in developing the habit of controlling and manipulating the pencil. Children can also be given chalks to draw patterns with both hands which help in development of the bilateral movement thus proper pencil holding. Children can be provided with stickers and by them just peeling them off and sticking on a paper or any hard surface; they can develop eye-hand coordination which results in proper pencil handling (Sara B 2017).According to Dinehart (2015), a good pencil hold allows children to make small finger movements and keep their wrist steady helping them in moving a pen or pencil in various directions to allow for the making of curved straight short lines are important in writing and letter formation. 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. 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 in cases 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. It is worth noting that if the tripod position is challenging to children but they are trying to perfectly write well without trouble, they should be left to continue with the writing style. This is because any form of alterations to their writing might cause problems tiring the child as they strive to learn a new hold (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 must 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. 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. This progresses as they develop more experience with fine motor activities which allows them in establishing more control over their finger

allowing them to develop a dynamic pencil grasp through holding their pencil with the fingers. Children must 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.

2.5 The Effect of Fine Motor Proficiency on Writing Legibility among Pre-Primary Learners

Writing legibility refers to the readable print or handwriting which means that words can be easily read. Findings from education to neuroscience highlight the role of young children's print-related skills including early writing in predicting and enhancing the development of their later literacy abilities. However, the field lacks standardized, comprehensive measures with relatively brief scoring systems that can capture the progression from scribble lines into shapes, letters, first words, and messages. Repeated writing samples from Tools of the Mind curriculum provided a unique opportunity to examine growth across 6 months of preschool. To score the continuum of early writing skills, they designed a pilot 9-point scale (Early Writing-9; EW-9). Inter-coder agreement was high (ICC = 0.96, $p < 0.001$). In a sample of 62 children aged three to five years of age, they scored an average of 16 weekly samples per child from the beginning of the school year until early spring. Findings from multilevel growth-curve models demonstrated that the development of early writing skills was substantial, highly variable and often rapid. In line with these findings, the current study used children of 4-5 years to determine how fine motor affects their writing legibility. The findings indicated that competency in fine motor has an effect on learners writing clarity as a writing outcome.

Writing legibility is an important writing outcome as it helps in proper shaping of letters to realise learners good handwriting. This can be seen from the study findings of multilevel growth-curve models where the shape of the trajectory yielded significant linear, quadratic, cubic, and quartic trends, consistent with a pattern of overall tapering growth. Among all predictor variables entered, including gender, age, and number of years in the program, only name-writing ability assessed at school entry predicted early writing scores after 6 months. Extensive research has provided greater understanding of the components, precursors and mechanisms involved in learning to read (Cunningham & Stanovich,1997; Lonigan,Schatschneider,7 Westberg,2008;Snow,Burns,& Griffin,1998).Yet less is known about pre-primary 1 learners early writing outcomes when mark-making becomes increasingly intentional and conventional as scribble turn into letters, words and messages (Gombert & Fayol,1992; Puranik & Lonigan,2011;Sulzby,1990). Potential reasons include traditional pedagogical constraints such as reading being taught before the more complex skill of writing (Yancey, 2009), and the lack of valid assessments and scoring systems for this young age group, aside from name-writing measures (Puranik & Lonigan, 2014).

The addition of more comprehensive, standardized measures of emergent writing would provide greater coherence in the field such as the ability to compare findings (Molfese et al., 2011; Puranik & Lonigan, 2011).One example highlights the disparity between the quantities of research on early writing compared to reading. Although Lonigan et al (2008) reported that the landmark National Early Literacy Panel (NELP) report found that writing and in particular name writing was one of the 6 key predictors of children's later literacy achievement where fewer than 5% of the 300 studies included a procedural writing task. Since then, empirical research on writing during the foundational preschool or pre-

kindergarten years has substantially increased (Gerde, Skibbe, Bowles, & Martoccio, 2012; Molfese et al., 2011; Puranik, Petscher, & Lonigan, 2012; Rowe &Wilson, 2016). Although, this study based on the impact of small muscle expertise on pre-primary 1 learners writing legibility.

According to previous studies, the demonstration of good handwriting legibility is facilitated by fine motor skills through the capability of regulating the writing instrument with accuracy and speed during the practice of undertakings like hand-operated dexterity, tin-hand tactic and fine motor accuracy. As such, fine motor skills in that manner, fine motor experiences are necessary for toddlers before they familiarise with the concurrent conduct of appropriately handling materials for writing. Unlike fine motor that begins in infancy, handwriting development is established based on previous perceptual motor skills and fine motor skills which form a motor standpoint implying that children need to be able to develop and master whole hand and arm movements before moving to the more intricate finger grasping and control required for writing (Huffman &Fortenberry, 2011). The Additional prerequisites for handwriting include neuromotor, intellectual, linguistic and perceptual motor skills (Bara & Gentaz, 2011; Dinehart, 2015). Also, there is visual-spatial processing which helps in the orthographic processing and copying of random patterns that are connected to more complicated handwriting development (Dinehart2015).

Seo (2018) ascertained that writing is an essential fundamental activity that requires to be done by children in junior primary education, and it is an important potential for scholarly achievement. However, due to the varied duration and speed in which children try writing according to the environmental experience, level of interest in letters and full growth of the nervous system, verification of the early stages of development is necessary in determining

children who have problems in performing handwriting tasks. Therefore, various dimensions of learner's handwriting such as the domain of writing legibility must be considered to assess the writing performance ability in children. Among the constituents that affect handwriting legibility include the letter sizes, letter display, letter shapes and the amount of space between the letters. In this case, there is necessity of developing legibility readiness skills such as visual understanding, fine motor skills, and in-hand manipulation among children before beginning the act of handwriting. This is because children who lack adequate maturity of the readiness experiences stand a chance of adopting awkward handwriting customs which results in poor legible writing.

According to previous studies which emphasize the importance of acquiring readiness skills before starting writing, there are various factors connected to the issues involved in this study. Among these factors, fine motor skills allow for demonstration of good handwriting legibility through the ability to control the handwriting tool with speed and accuracy over the course of activities such as fine motor precision, manual dexterity, and in-hand manipulation (Seo 2015). As such, fine motor skills are essential for children before developing the repeated behaviour of holding appropriate writing utensils. Previous studies have focused on the factors of and correlation between visual perception and visual motor integration, As such, existing research on this topic lacks study on the influence of fine motor proficiency on writing legibility. The present study therefore attempted to find out how fine motor influences readable writing. In a study done to identify how fine skills impact on readable handwriting, the Korean Denver Development Screening Test and Korean visual discernment screening examinations were carried out in order to identify normal development of participants (Seo 2015). However, the present study used observations, checklists and questionnaires to identify how readable writing is influenced by fine motor experiences.

In another study conducted by Clark (2010), legibility was found to be important to writing as it is one of the methods of measuring handwriting through which learners wrote small letters from memory in alphabetical order. Berninger and Rutberg (1992) implemented rules using a scoring system that counts legibility and order for the written letters for grades 1-9. However, the present study incorporated questionnaires using the Likert scale to account for the effect of fine motor proficiency on writing legibility as a writing outcome among pre-primary 1 learners.

2.6 Relationship Between Fine Motor Proficiency and Letter Formation among Pre-Primary 1earners.

Fine motor is the control of in movements usually integrating the synchronisation of the eyes, hands, fingers with the small muscles. Letter formation refers to the capacity to correctly develop alphabet letters that conform to a cultural standard as taught in schools. Letter formation is very important for learners to become efficient writers and achieve success at school. For fine motor skills to be functional and help in proper letter formation, they require coordination of controlled arm, hand and finger movement as well as proper timing.

According to Pienaar et al., (2014) the building of phrase like skills such as alphabetic knowledge and phonological awareness require the help of early writing which is necessary in receiving and writing well known written language signs to pass across information and thoughts. (Puranik & Lonigan, 2011). However, the fact that writing instruction integrates cultural and social elements (Dyson, 1987. A complex incorporation of language, intellectual and muscular processes is unveiled through toddlers who become exclusive-minded and get themselves involved in early writing behaviours (Bialystok & Martin, 2003). This controlled

by various capacities is necessary in the recalling of a particular letter shape from memory for the printing of an identifiable form along a parallel line (James 2017).

According to Levin et al (2005), a clear representation of a milestone in literacy development is the initial letters that are often written by children from the recognizable and meaningful individual name. Therefore, the initial stages of the skills involved in writing names may indicate an ability to rote tell a logogram rather than an applied knowledge of letter names or deeper letter-sound similarity (Blood good, 1999). An example of this is among the Dutch pre-schoolers who were better in name writing where 37% identified the second letter while 80% correctly identified the initial letter (Both-De Vries& Bus, 2010). Further indication comes from a study of 286 pre-schoolers which demonstrated the capacity to write numerous dictated letters. The above examples indicated that the acquisition of enough orthographic skill was critical for the achievement of advanced writing abilities. Also, the importance of pre-schoolers involvement in varied exercises through socialization improves their fine motor skills as well as their gaining of better social skills (Özkür, 2019). Moreover, past movement events become the basis for socialization and progress in subsequent motor development periods where motor proficiency is the consequence of a long developmental process that involves active involvement in appropriate children's activities (Clark, 2007; Barela, 2013). Motor skills result to the successful investigation of the surroundings by infants, who develop their understanding of the world through such behaviour (Piaget, 1952). Various studies have shown that the experiences of children with self-produced locomotion are related to intellectual abilities such as the permanence of objects and spatial information organization (Bertenthal, Campos, & Kermoian, 1994; Campos et al., 2000). Hence; learners writing development is connected with fine motor skills however the present study identified the

relationship between fine motor competence and letter formation using 385 parents as respondents.

Advances in neuropsychology also provide knowledge based on brain function and structure about the relationship between motor skills and cognition hence when we consider the literacy capabilities of reading and writing, they are structured from cognitive abilities such as visual, phonological and semantic systems (Son & Meisels, 2006). Challenges in literacy skills can be as a result of poor conditions observed in other systems that writing and reading skills emerge from (Rosenbaum, Carlson, & Gilmore, 2001). Therefore, preschool children are instructed to acquire basic reading and writing literacy skills during preschool education which provides the basis for the achievement of primary school curriculum objectives. Also, before beginning the act of writing, children need to develop readiness skills for forming letters such as the comprehensive abilities of various sensorimotor systems, the development of large and small muscles, visual perception, fine motor skills, and in-hand manipulation skills. This is because if children without sufficient development of such readiness skills learn writing, they are at risk of developing bad handwriting habits, which may lead to difficulties in developing handwriting legibility.

As a matter of fact, fine motor organization together with the planning of visual and hand take manoeuvres is important in enabling the young ones to copy letters because writing depends on motor distinction, intellectual, and language capacities Lockman, 2015). This research based on association of small muscle occurrences and writing development because there have been evaluations on the importance of smooth muscles, handwriting development and the link between them. This is because executive function, attention and future academic success have been connected to perceptual and fine muscle capabilities in the initial stages of

education. The capability of shapes duplication and letters had an important positive influence on elementary learner's scores in numeracy where the practice of handwriting may necessitate letter recognition and reading acquisition in young children (Poudou, &Velay, 2005).

Letter formation and recognition which are the building blocks for reading acquisition may be enhanced in early childhood through the practice of handwriting. This is because early writing development offers the basis for appropriate future writing into the primary school and beyond. Maths's skills and reading in primary school has been connected to muscular and distinctive motor (Son &Meisels, 2006). This gave the baseline to focus on fine motor look at fine motor competence as a forecast of writing development although other scholars also suggested that there are connections between muscular dexterity, executive function and distinctive motor abilities (2018), as infants, children undergo through developmental stages from hand grasp to a maturity development at six years. Research has also outlined agreeable differences in full grown pencil grasp that does not influence speed or ability to read in writing. This means that there is need for further development of the hand muscles and fine motor skills for learners who have challenges with writing speed and issues in letter formation. Learner's subjection to scribbling maturation exercises in kindergarten settings and beyond results in the connection of writing development with initial and middle toddlerhood academic learning. This is because there is the ability to write which integrates both the intellectual, motor and neuromotor processing skills among young children through the learning of early writing skills and letter awareness when practicing name writing and other number, shapes, lines and letters, hence the writing capability integrates a connection of intellectual, motor and neuromotor processing skills (Dinehart, 2015).

According to Dinerhart (2015), little attention is paid to children's daily activities in teacher training and research yet children's half day is spend engaged in fine motor activities. By two years, children begin to draw and scribble where early stages of writing and drawing develop in stages as they begin forming geometric shapes including horizontal and vertical lines as well as they also learn to draw with directionality. As they improve in their writing abilities by three to four years, children start producing accurate numbers and letters by practising writing their names followed by multiple sounds, symbols and numbers (Dinehart, 2015). It must be understood that it might take time for a child to master the act of handwriting and become proficient because writing development is generally difficult and slow based on the capability of the learner and development (Bara & Gentaz, 2011). Hence, fine motor skills dependent on patience, judgement, coordination and muscular control which are essential for writing development (Huffman & Fortenberry, 2011).

In order for preschool children to appropriately know how to write, they must first learn the letter sounds and their names as well as how to write the letters. They also need to understand phonemic awareness by Richgels (2003) which involves comprehension and manipulation of speech sounds which are crucial to both the writing and reading processes. This is because learners' words reading ability is interconnected with their capacity to write words and letters and they might have challenges mastering similar phonemes necessary in spelling and writing if they do not develop phonemic awareness (Berninger, 2000 ; Domico, 1993; Richgels, 1995). According to Fitzgerald & Shanahan (2000), the fact that writing and reading are potential related, they are not similar intellectual procedures because word pronunciation is simple than selection of words and noting them down in books. Most schools presume that learners are in a position to know everything that is necessary for writing from the reading guidelines or the simple writing by only providing reading

instruction. Yet, handwriting is a learning procedure that requires guidelines for appropriate growth of the skill. Also, connection between writing and fine dexterity is usual, but scholars struggle to determine the muscular elements that perform critical function in letter formation as it is presumed to be connected to the quality of handwriting (Schneck, 1991). This forms the basis of the present research which dealt with the determination of the link between small muscle competency and writing development where letter formation is involved.

According to Roston, Hinojosa, & Kaplan (2008), the practise of forming letters is not important in writing since studies on writing expertise particularly elements that influence formation of letters always occur in the studies of grades 1-3 learners. Unlike writing studies which focus on primary grades, this study based on the writing outcomes because foundation begins at the pre-primary level up to later levels. Grissmer et al. (2010) evaluated the influence of smaller muscles on academic success and showed that early fine muscle experiences are consistent and great determiners of future success. Other study findings indicated that the growth of smaller muscle knowledge in early years is connected to the intellectual maturity. However, the fact that there are no studies highlighting the link between fine motor and writing outcomes there arose the need to investigate the influence of fine motor proficiency on writing outcomes among pre-primary 1 learners.

2.7: Summary of Literature and Gaps Identification

Author	Title	Gaps
Akyol, Ahmet & Hayriye (2014)	Development of reading experiences of learners having difficulties in reading	Context: learners experiencing reading difficulties

		Sample size: 300
Listyani (2018)	Enhancing academic writing skill through 'reading' to learn	Context: academic writing skill Design: qualitative
Curby & Curby (2014)	Fine motor capacities and pedagogical achievements	Context: growth of learner's small muscles Design: qualitative approach Sample size: 295
Dinehart (2015)	Early writing for future purposes	Design: qualitative Local: India Context: learners writing readiness Sample size: 39

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter focused on the research design, study location, the target population, sampling technique and the sample size. The data collection instruments, data collection procedures, validity, reliability, and piloting of the research instruments. It also looked at the proposed data analysis and the study ethics.

3.2: Research Design

The study adopted a survey research design to address the influence of fine motor knowledge as a forecast of writing outcomes among children. This research design allows a researcher to collect data by interviewing or administering questionnaires to a sample of individuals within a short period of time. The research design helped in collection of data using questionnaires to measure the relationships between the independent variable (fine motor proficiency) and the dependent variables (pen-handling, writing legibility, and letter formation). This study utilized the survey research design to administer questionnaires to a small group of people to identify their trends in attitude and opinions (Creswell, 2018). In this study, the design encompassed determination of characteristics of specific occurrences in relation to an empirical foundation or investigation of the connection between two or more events (Creswell 2002). Qualitative data was collected using the survey research design which is a method that involves asking questions to get answers on how someone perceives an occurrence (Ponto 2015). The reason for this was to enhance 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). Also, this method allowed for the general

representation of a larger population that paved way for appropriate data collection and proper statistical significance. This is because there was asking of many questions about an area resulting in effective analysis of data. Moreover, the research design saves time compared to other methods hence it is easy to administer, it is less costly and there is little or no observer subjectivity because it is not ideal for controversial issues which results in precise results. Also, different types of information such as beliefs, opinions, feelings and behaviour among others which are free from different errors can be obtained.

3.3: Location of the Study

The study was conducted in Kakamega East Sub County which is found in Kakamega County in Kenya. In this sub county, all the preschool children lived with their parents and guardians within the sub-county and the learners went to school by foot with only a few exceptions who were transported to school every morning and back home in the evening by motorbikes or bicycles because most of the public preschools are situated within the learner's locality. In this area, most of the preschool centres did not allow children enough free space and time to be involved in play activities that strengthen their fine muscles as most of the time was used in the learning of other activity areas.

Most of the preschool teachers in this location are trained as a majority of them have diplomas and certificates in Early Childhood Education (ECE) and they are in a position to positively influence learners writing outcomes (Dinehart 2018). Also, most of them attend academic seminars on how to incorporate various activities into the daily learning activities of the learners. On the other hand, most of the parents are literate as they desire their young ones to be well educated as they take them to good public schools. A majority of the parents are also concerned with the learning of their young ones as they try to provide the necessary learning materials.

The fact that it is unclear whether 4–5-year-olds in Kakamega county are proficient enough in their fine motor and how well this is able to predict emergent writing outcomes given that most of the learners are not appropriately exposed to activities of fostering the same necessitated the need to carry out a study on fine motor as a predictor of writing outcomes among pre-primary 1 learners in Kakamega East subcounty, Kakamega county, Kenya.

3.4: Target Population

According to Creswell (2013), a target population is a group of individuals living in the selected area of a study. The research targeted the 97 public preschools in Kakamega East sub-county from which the researcher obtained 6 preschools. The researcher also targeted 6 teachers-in-charge and 385 pre-primary 1 learners and parents.

3.5: Sample Size and Sampling Procedure

A sample is a section of people chosen from an entire population. Sampling refers to the selection of the group that you will actually collect data from in your research while sample size determination is the action of selecting the number of observations to integrate in a statistical sample. According to Creswell (2014), the identification of time, cost or convenience of information gathering and its necessity in providing sufficient statistical power requires the use of a sample size.. 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. Purposive sampling was used because it focused on characteristics of the selected schools, the teachers and pre-primary 1 learners that were of interest hence it facilitated accurate responding to the interview questions. Purposive sampling facilitated the researcher to select the highly populated classrooms as a means of identifying the attention given to each learner by the teacher in terms of fine motor proficiency and writing. Also, it was a technique in which the researcher relied on their views when identifying residents of an area to incorporate in the study. Also, purposive sampling was used because it is an effective method when only a few individuals are used in getting information due to the state of the research objectives and design. Proportionate sampling

was used to select the 385 pre-primary 1 learners because it is accurately used in a study population that is made up of different small groups that vary in composition and the number of study participants from each group is identified by their number in relation to the entire population.

Table 3.1: Sampling Frame

Respondent	Population (N)	Sample Size (n)	Percentage (%)
Public preschools	97	6	6
Teacher-in-charge	97	6	6
Parents	3850	385	10

Source: Field data 2021

3.6: Research Instruments

The study used questionnaires, interview schedules, observation checklist, and document analysis guide to gather relevant data on fine motor excellence and writing outcomes in learners.

3.6.1: Questionnaire

A questionnaire is any set of written questions and random inquiries on the respondents (Kumar 2011). Questionnaires were designed for the sampled parents to enable data collection on pre-primary 1 learners' fine motor skilfulness and writing outcomes. This study modified the Ministry of Education's Kenya Schools Readiness Assessment Tool (KSRAT 2015) to evaluate pre-primary 1 learners' proficiency in fine motor as well as the writing outcomes. The KSRAT is a standardized tool that was modified to collect and measure information on learner's fine motor excellency and the writing outcomes using a score of 1-5 marks with 5=Excellent; 4=Very Good; 3=Good; 2=Satisfactory; 1= Fair with the highest score of 50 for each of the items for a given experience. The parent's questionnaire was considered because it was easy to issue and it enabled the researcher to gather relevant information within a short period of time (Creswell 2014). The questionnaire was self-administered and it solicited information on pre-primary 1 learner's fine motor proficiency and writing outcomes using the KSRAT tool.

The tool had a total of thirty-two items whose indicators under fine motor proficiency were adequate materials that promote fine motor, learner's involvement in fine motor activities, teacher's involvement in learner's fine motor, time allocation for fine motor, learner attitude towards fine motor activities, and learners hand manipulation during fine motor activities. There was proper drawing, use of a paper punch, holding small items with tweezers, making mosaic from thick papers, proper tracing, colouring, pasting, and cutting on a straight line. Pen-handling indicators were continuous exercising with play dough, proper in-hand manipulation, pencil holding with a substructure, and proper highlighting. It also involved name writing, proper sketching on a line with control, appropriate duplicating of numbers 1-5, copying simple pictures using geometric shapes, independent drawing of pictures, and proper cutting out of simple shapes. The indicators of writing legibility involved positive

attitude towards writing, concepts about print, stable-in-hand manipulation, proper letter shaping and forming, proper motor visual coordination and appropriate early writing skills. Letter formation indicators were learner's frequent involvement in letter formation activities, availability of letter formation activities, availability of materials fostering letter formation, and assessment of learner's letter formation by the teachers.

3.6.2 Teachers-in-Charge Interview schedule

An interview is basically a list containing a set of arranged questions prepared to function as guide for investigators and researchers in gathering data or information about certain topics or issues. The researcher administered interview schedules in form of oral in-depth questions to the sampled preschool teachers-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 used interview schedules because they allowed for the provision of a protocol onto which interviewers asked and recorded answers in an appropriate manner across all the parties. It also facilitated smooth flow of the question-and-answer session. At the end of the interviews, well-structured interviewees responses were noted down by the researcher for smooth selection and encoding with results from other instruments.

3.6.3 Pre-primary 1 learner's Observation Checklists

A method of gathering information by viewing is referred to as observation. This method is grouped as a participatory study since the researcher has to indulge themselves in the settings and activities of the respondents as they note down what they see or record the events that happen. The researcher used the structured or systematic observation where she collected

data from pre-primary 1 learners using specific variables; the independent variable (fine motor proficiency) and dependent variable (pen-handling, writing legibility, and letter formation), and in line to a pre-determined routine. The researcher used structured observation because the method included accessibility to research happenings, high levels of flexibility in terms of use and generating a permanent record of events to be referred to later. The researcher sought full informed consent of research participants as the basis of ethical needs to be followed by researchers.

3.6.4 Document Analysis Guide

Document Analysis Guide (DAG) is a form of qualitative research in which official papers are expounded by the researcher to give voice and meaning around an area of evaluation (Saunders & Thornhill, 2012). This tool was designed to gather data on the presence of instructional materials and details of excellence in fine motor and writing outcomes of learners. The document analysis guide looked at the pre-primary 1 instructional materials pertaining fine motor and writing development such as the textbook, writing materials, drawing books, crayons, plasticines, plain papers, pencils, digital media, sand pit area, playground, and building blocks.

Table 3.2: Summary of Research Instruments

Research Tool	Respondents/ participants	Data collected	Type of Data
1. Questionnaires	Parents	Learner's fine motor proficiency and writing outcomes	Ordinal data Interval-Likert scale

2. Interview schedules	Teachers-in-charge	Teachers and learners' characteristics Learner's fine motor proficiency and writing outcomes	Ordinal data-Likert scale
3. Observation checklist	Pre-primary 1 learners, teachers	Activities and materials fostering fine motor and writing, learners and teachers' involvement in fine motor and writing	Ordinal data
4. Document analysis guide	Teachers, pre-primary 1 learners	Teaching and learning materials fostering fine motor and writing	Ordinal data

Source: Researcher 2021

3.7: Piloting

Piloting is a small-scale study which helps in refining the research methods and procedures. The researcher carried out pilot testing in 3 preschools that were not used in the study to form and measure the effectiveness of the research tools as well as to evaluate the practicability of a full study scale. Pilot testing was also done as it helped the researcher to rule out the

unrealistic questions, restructure and enhance the complicated questions and choose appropriate data analysis methods (Mugenda and Mugenda 2013). The instruments were pilot tested using the split half technique where the researcher used a 10% of 384 which was the initial sample size to get the pilot study sample size. The research instruments were then amended based on pilot responses before preparation of the final instrument.

3.8: Validity of the Study Instruments

According to Orodho (2009), validity is the extent to which a test measures what it is expected to measure. It therefore relates to the appropriateness of the tool to yield data that is relevant to the study objectives. To enhance validity, the study adopted content validity to determine the extent to which items in the data collection instruments were adequately sampled and the content investigated (Burns & Burns, 2008).The research instruments were developed with close discussions with specialists in (MMUST) who ascertained their content (Foxcroft 2004) together with the findings from the pilot study.

3.9: Reliability of the Study Instruments

Reliability of the study is the expanse to which questionnaires, measurement or observation procedures realise constant outcomes or firmness of grades under same situations (Malhotara & Dash 2011). Reliability therefore assessed the accurateness of data collection tools as measures of the variables under study. Reliability of the research instruments was ascertained using the split-half correlation. The research tools were split into first and second half sets and scores from each set of the items computed and correlated using Pearson's Product Moment Correlation coefficient (r) to determine the correlation coefficient between the two

sets of data. In this case, the coefficient was +0.7 which reflected a stronger reliability (Mugenda and Mugenda 2013). In addition, coding of questionnaire and gradual counter-rechecking of constant coding, avoidance of spelling and typing errors were helpful in making the tools more suitable for the study.

3.10: Procedure for Collecting Data

The researcher sought permission from the school of graduate studies, (MMUST) after which the permit from National Commission for Science, Technology and Innovations (NACOSTI) was also sought. The researcher then reported to Kakamega East Sub County Education office and presented a copy of the NACOSTI letter upon which a research authorization letter was given by the County Commissioner. The researcher also sought permission from the ECD County Director who permitted research to be carried out in the chosen area. Permission was then sought by the researcher from preschool teachers-in charge and informed them of the study, the purpose, the variables involved and the study instruments. The researcher then requested the parents to be part of the study through the agreement letters which were issued by the teachers-in-charge. The researcher identified 6 ECD diploma holders for the sampled pre-schools and trained them on methodology of data collection and ethical issues when collecting data who then served as research assistants. The assistants were in charge of administering the parent's questionnaires and conducting the document analysis guide while the researcher administered the teachers-in-charge interview schedules and the observation checklists. The researcher then ensured no research information was shared by administering the research tools in schools on the material day onto which the interview schedules for teachers-in-charge, observation checklists, parent's questionnaires, and document analysis guide were self-administered in the presence of the research assistants and the researcher.

3.11: Proposed Data Analysis Procedure

Qualitative data was analysed using frequencies, percentages, central tendencies and simple linear regression. Quantitative data was descriptively analysed using percentages, means and frequencies. Linear regression determined the relationship fine motor skilfulness and pen-handling, writing legibility, and letter formation. Also, Anova test was used for the hypothesis testing. Data gathered from the tools questionnaires was displayed in graphs and table forms and it was categorised into emerging themes and analysed based on the study objectives.

Table 3.3: Data Analysis by Objective

Objective	Independent Variable	Dependent Variable	Statistical Tool	Presentation

1. Effect of fine motor proficiency on pen-handling	Fine motor proficiency (Nominal, ordinal, interval)	Pen-handling (Interval)	Frequencies Percentages Central tendencies Linear regression	Tables and graphs	
2. Effect of fine motor proficiency on writing legibility	Fine motor proficiency (Nominal, ordinal, interval)	Writing legibility (Interval)	Frequencies Percentages Central tendencies Linear regression	Tables and graphs	
3. Relationship between fine motor proficiency and letter formation	Fine motor proficiency (Nominal, ordinal, interval)	Letter formation (Interval)	Frequencies Percentages Central tendencies Linear regression Anova	Tables and graphs	

Source: Researcher 2021

3.12: Ethical Considerations

According to Kothari (2014), research ethics aid in reconciliation and protection of conflicting values and interests. In order to conduct a good research, responsibility on part of the researcher must be considered and a research protocol should be developed and adhered to. In this case, the researcher ensured all contributors and collaborators carefully agreed to the research protocol, and the precise roles of each team member were spelled out early. The research therefore sought to answer specific questions rather than just collecting data. This study sought the approval from the School of Graduate Studies (SGS) in (MMUST). The researcher then obtained a research permit from the National Council for Science and Technology Institute (NACOSTI) and letters of permission from other relevant authorities. The permit was then circulated to the Kakamega County education office upon which a research authorization letter was given. The research permit with the research authorization letter was then circulated to the head teachers of the sampled pre-schools. Through the school headteachers, the research authorization letter was given to the preschool teachers-in-charge and the purpose of the study was well explained to the research respondents.

Research participants were then briefed and informed about the title and aim of the study instruments that were to be used and the information to be solicited for as well as their role in the study. Consent from parents and teachers-in-charge who were part of the study was then sought and only those parents and teachers-in-charge who were willing to partake of the study were involved. For the illiterate parents, the consent was well reads and translated in Kiswahili for easy understanding. There was also an assent for the pre-primary 1 leaners who participated in the study. 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

information obtained was only to be applied for the justification of the research and in no way was the researcher corrupted or applied other unwanted means to get information for this study. Acknowledgement and credit were given to all contributions of this study. In addition, quotation of intellectual materials and property to be utilized in this study was adhered to as a means of avoiding copying.

Table 3.4: Ethical Concerns Table

Ethical Issue	Explanation
Participant Consent and Voluntariness	Participants were informed of the purpose of the research where participation was voluntary. Upon reading and understanding the participating terms, respondents signed a consent form.
Confidentiality	Participants response to the study were anonymous and kept confidential.
Interviewer/Respondent gender parity	Interviews were conducted in neutral area where both genders were comfortable.
Minimizing harm and violation of human rights	An anonymous feedback mechanism was established for the study respondents to report any perceived violations of their rights in data collection.

CHAPTER FOUR

PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents the research findings, their interpretations and discussion. The organization of this chapter is based on the objectives that guided the study. The findings are presented in line with the three research objectives which are: To establish the effect of fine motor proficiency on pen-handling among pre-primary 1 learners, to establish the effect of fine motor proficiency on writing legibility among pre-primary 1 learners, and to determine the link joining fine muscle skillfulness and letter formation.

4.2 Response rate and Variables used in the Study

This section presents data on distribution of teachers-in-charge and parents as the respondents sand the descriptive statistics of variables used in the analysis of data.

4.2.1 Distribution of Teachers-in-charge and Parents

A total of 6 teachers-in-charge and 385 parents were sampled as the study respondents.

Table 4.2.1: Distribution of Teachers-in-charge and Parents

Respondents	Sample Size	No of Respondents	Percentage
Teachers-in-charge	6	6	100%
Parents	385	370	96.10%
Total	**391**	**376**	**96.16%**

Source: Field Data 2021

Table 4.2.2: Items used in the Analysis of Data

Item Label	N	Range	Minimum	Max	Mean	Scale
Pen-handling						
Exercising with play dough continuously	370	4	1	5	2.8	Interval
In-hand manipulation activities	370	4	1	5	2.66	Interval
Holding pencil with tripod grasp	370	4	1	5	3.34	Interval
Coloring entire picture	370	4	1	5	3.78	Interval
Writing their name	370	4	1	5	2.88	Interval
Tracing on line with control	370	4	1	5	1.82	Interval
Copying numbers 1-5	370	4	1	5	3.72	Interval
Copying pictures using geometric shapes	370	4	1	5	2.0	Interval
Independent drawing of pictures	370	4	1	5	2.78	Interval
Cutting out simple shapes	370	4	1	5	2.69	Interval
Writing Legibility						
Positive attitude towards writing	370	4	1	5	3.46	Interval
Concepts about print	370	4	1	5	2.81	Interval
Stable in-hand manipulation	370	4	1	5	3.12	Interval
Proper letter shaping and forming	370	4	1	5	3.29	Interval
Motor-visual coordination	370	4	1	5	3.06	Interval
Early writing skills	370	4	1	5	3.57	Interval
Letter Formation						
Learner's involvement in letter formation activities	370	4	1	5	3.11	Interval
Availability of letter formation activities	370	4	1	5	2.96	Interval
Materials fostering letter formation	370	4	1	5	2.74	Interval
Teacher assessment of learner's letter formation	370	4	1	5	3.67	Interval
Fine motor proficiency						
Materials promoting fine motor	370	4	1	5	7.3	Interval
Learners' involvement in fine motor	370	4	1	5	2.5	Interval
Teachers' involvement in fine motor	370	3	2	5	3.5	Interval
Learners attitude towards fine motor	370	1	4	5	4.5	Interval
Learners hand manipulation	370	3	2	5	3.0	Interval
Pasting	370	1	3	4	4.3	Interval
Joining dots	370	2	3	5	4.3	Interval
Drawing	370	2	3	5	4.3	Interval
Use of paper punch	370	1	4	5	2.5	Interval
Making mosaics	370	1	3	4	3.2	Interval
Time allocation for fine motor activities	370	1	3	4	3.5	Ratio

Source: Questionnaires Field Data, 2021

From Table 4.2.2 above, the items used in the analysis of data were of ratio and interval scales thus one item (1) was ratio and thirty-two (32) intervals. The independent variable of the study was fine motor proficiency and the descriptive statistics in Table 4.2.2 shows the means of various fine motor proficiency activities where (7.3) is for materials promoting fine motor, (2.5) is learners' involvement in fine motor activities, (3.5) is teachers' involvement in learners fine motor activities, (4.5) is learners' attitude towards fine motor, and (3.0) is for learner's hand manipulation. (4.3) is for pasting, (4.3) for colouring, (4.3) for joining dots, (2.5) for drawing, and (3.5) for time allocation for fine motor activities. The dependent

variables were pen-handling, writing legibility, and letter formation which are nominal, ratio, or interval scale thus they are used in objective 1, 2, and 3 data analysis respectively. The first variable of the study was pre-primary 1 learner's pen-handling. This is shown in Table 4.2.2 where the descriptive statistics indicate the means of various pen-handling activities where (2.8) is exercising with play dough continuously, (2.66) is stable in-hand manipulation, (3.34) is holding pencil with a tripod stand, (3.78) is colouring entire picture, (2.88) is writing their name, (1.82) line illustration (3.72) is number duplication 1-5, (2.72) is copying pictures using geometric shapes, (2.78) is independent drawing of pictures, and (2.69) is cutting out simple pictures. The second variable of the study was pre-primary 1 learner's writing legibility. The descriptive statistics in Table 4.2.2 indicate the means of various activities done in writing legibility where positive attitude towards writing had a mean of (3.46), concepts about print (2.81), stable in-hand manipulation (3.12), proper letter shaping and formation (3.29), motor visual coordination (3.06), and early writing skill (3.57). The third variable of the study was pre-primary 1 learner's letter formation. The descriptive statistics in Table 4.2.2 indicate the means of the various activities where (3.11) is for learners' involvement in letter formation activities, (2.96) for availability of letter formation activities, (2.74) for availability of materials fostering letter formation, and (3.67) for assessment of learner's letter formation by teachers.

The study also sought to find out the characteristics of teachers-in-charge and the learning and teaching resources used in pre-primary 1 classrooms as this was important in understanding the effect of teachers' gender, teaching experience, and age on learner's fine motor proficiency and writing outcomes.

Table 4.2.3: Description of Items used in the interview schedule and observation checklist

Item	N	Range	Min	Max	Mean	Scale
Teachers' characteristics						
Gender	6	M=2 F=4				Nominal
Age	6	10	35	45	39.33	Ratio
Teaching experience	6	2	4	6	5.33	Interval
Teaching and learning resources						**Scale**
School offer pen-handling activities?	**Yes%**					Nominal
Pre-primary 1 learners benefiting from fine motor and pen-handling activities?	100%					Nominal
Regular changing of pen-handling activities	100%					Nominal
Teachers full involvement in learners pen-handling?	66.67%					Nominal
Enough fine motor materials	83.33%					Nominal
Materials 16.67%						Nominal
Different shapes and patterns	100% 100%					Nominal

Tracing papers		Nominal
Letter families	83.33%	Nominal
100%		
	0%	
Learning Activities		
		Nominal
Cutting		
	16.67%	Nominal
Making mosaic from thick papers	16.67%	
		Nominal
Using a paper punch		
		Nominal
Holding small items with tweezers		
		Nominal
Tracing		Nominal
100%		
		Nominal
Pasting		
66.67%		Nominal
Drawing 100%		
Joining dots 100%		

The results of Table 4.2.3 reveal that most of the preschool teachers are female. The teachers are below 45 years which is an appropriate age for teachers since they are still energetic and well versed with the preschool curriculum and they can positively influence pre-primary 1 learner's writing outcomes. Most of the teachers have a teaching experience of 6 years which implies that they are well equipped with relevant skills that can promote learners positive writing outcomes. Table 4.2.3 indicates that all the pre-schools offer pen handling activities and all the pre-primary 1 learners benefit from the activities which is a good indicator. However only 4 of the pre-schools frequently change the pen-handling activities while the rest do not. This implies that only a few learners are subjected to different pen-handling exercises and the rest are not which may negatively impact on those learners whose activities are not frequently changed. It is clear that 83.33% of the teachers are involved in learner's

pen-handling activities while 16.67% are not. This implies that most of the teachers are available to guide learners which positively affect their pen-handling.

From the teachers-in-charge interview schedules, it was clear that most of the schools had inadequate course books in writing activities. Some of the pen-handling materials that were lacking include water paints with brushes, plasticines, bottles and sand pit areas, scribbling pencils among others. When asked why, the teachers-in-charge said that 'the county government is not fully supporting us in terms of course books'. When the researcher inquired about parents, the teachers said that 'most of the parents are ignorant while others are illiterate which makes it difficult for them to support their learners by providing course books as they all rely on the county government's donation'. Most of the schools did not offer fine motor activities to promote writing legibility such as cutting, making mosaics from thick papers, using paper punch, and holding small items with tweezers. Also, the teachers said that 'we lack the resources to use for promotion of fine motor proficiency and writing outcomes. However, to ease the burden of resources, materials can be improvised by learners using clay for modelling, scribbling using sticks and fingers on the ground as well as filling plastic bottles with sand among others. Moreover, teachers confessed that 'we provide appropriate lined papers, we frequently check children's writing position, provide a model of appropriate handwritten letters as well as involve ourselves in learner's writing legibility'. The teachers also said that 'we provide verbal cues for letter formation.' However, none of them was involved in highlighting lines for the learners. This implies that the teachers are concerned with the learners writing legibility as they are fully involved in fostering the same. Concerning activities done to foster fine motor and improve letter formation, the teachers were involving learners in cutting activities, tracing, drawing and colouring, joining of dots and pasting which is a good implication on learner's letter formation.

The study also sought to find out information about learner's activities and exercises from their books and the resources used in and out of the classrooms.

Table 4.2.4: Data from the Document Analysis Guide

Resources	Available	Adequate	Accessible
Textbooks	100%	50%	83.33%
Writing material	100%	66.67%	100%
Drawing books	66.67%	66.67%	66.67%
Crayons	100%	66.67%	66.67%
Plasticines	33.33%	16.67%	16.67%
Plain papers	16.67%	16.67%	16.67%
Pencils	100%	50%	100%
Playground	100%	100%	100%
Sand pit area	16.67%	16.67%	0%
Building blocks	16.67%	16.67%	0%

The results from the document analysis guide reveal that all the 6 public pre-schools had textbooks although they were adequate in three of the schools and only 5 schools were accessible to the textbooks. Most of the teachers argued that they had few textbooks which was challenging in terms of teaching since the learner's book ratio was not well distributed. 6 schools had writing materials which were accessible however only 4 schools had the writing materials in adequate quantity while 2 did not. 4 of the schools had drawing books while 2 did not have pre-primary 1 learners drawing books which is alarming since drawing is a basic

requirement for learner's writing outcomes and without drawing, learners might not have positive writing outcomes. A majority of the teachers-in-charge expressed their concern in this area as they said ' we are trying to liaise with the County Government of Kakamega to fund us which will facilitate purchase of fine motor skill materials that will enhance learners' proficiency. Others said parents were not supportive as they did not provide learners with relevant materials because most of the parents don't have enough funds to support the same. This was to be mitigated through improvisation of pen-handling materials from locally available materials. Moreover, the fact that parents view fine motor activities as messy, chaotic and time consuming makes they shy away from supporting the same.

When it comes to crayons, pencils, and playground, all the 6 pre-schools had them in adequate quantities apart from a few that did not. This is a good indication as expressed by the teachers who said they have an easy time when it comes to drawing and colouring. They also said the playgrounds were accessible which offers a chance for both structured and unstructured play activities such as jumping, ball games, throwing and catching, running races, tyre races among others which enhance learner's fine motor proficiency improving writing outcomes. From Table 4.2.4, it is clear that only 1 out of the 6 pre-schools had the sand pit area, plain papers, and buildings blocks although they were inaccessible which is not good for pre-primary 1 learners. One of the teachers-in-charge said that 'we had the sandpit but it was transferred to an inaccessible place which has limited the learners' accessibility hence we don't engage them in sand activities such as filling and emptying bottles.' This implies that there is no exploration with the small muscles because at this age learners need to explore with their fine motor skills through drawing and other activities which easily happens in the sandpit area. At this age, learners are also expected to build and construct structures using blocks as well as draw on plain papers. The absence of these essential needs is a

concern which must be put into consideration to ensure sufficient learners' fine motor development for positive writing outcomes.

4.3 Effect of Fine Motor Proficiency on Pre-primary 1 Learners Pen-handling

The first objective of the study was to determine the influence of fine motor proficiency on pre-primary 1 learners pen-handling in public preschools. The question of the objective was 'what is the effect of fine motor proficiency on pre-primary 1 learners pen-handling'. This 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 indicates pre-primary 1 learners pen-handling where the positive sign of the coefficient indicates increased pre-schooler's pen-handling. The significance of the relationship between the fine motor competency and pen-handling was tested at $\alpha=0.05$. The results of the simple linear regression model are presented in Tables 4.3.1, 4.3.2 and Figure 4.3 below.

Table 4.3.1: Pre-primary 1 Learners Fine motor Proficiency and Pen-handling

Model Summary

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

a. Predictors: (Constant) Fine motor proficiency

Source: Field Data, 2021

Table 4.3.1 outlines the simple correlation between fine motor proficiency and pen-handling. There is a negative correlation which ranges from -1 downwards while a positive correlation ranges from + 1 upwards. From Table 4.3.1, R represents a strong positive correlation (0.790) between fine motor proficiency and pen-handling. The results of R Square are depicting how much of the variation in pen-handling can be explained by fine motor proficiency. Thus, 0.624 which is 62.4% of the variation in pen-handling can be explained by fine motor proficiency. Table 4.3.1 indicate that the constant of the regression is statistically significant implying that the variables fit in the model were able to predict the outcome variable. The variables in the model were able to predict 0.624 (62.4%) of the variation in the pre-primary 1 learners pen-handling. This implies that fine motor proficiency helps to improve pre-primary 1 learner's pen-handling.

Table 4.3.2: Pre-primary 1 Learners Fine motor Proficiency and Pen-handling Coefficients

Model	Unstandardized coefficients		Standardized coefficients	T	Sig
	B	Std. Error	Beta		
(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

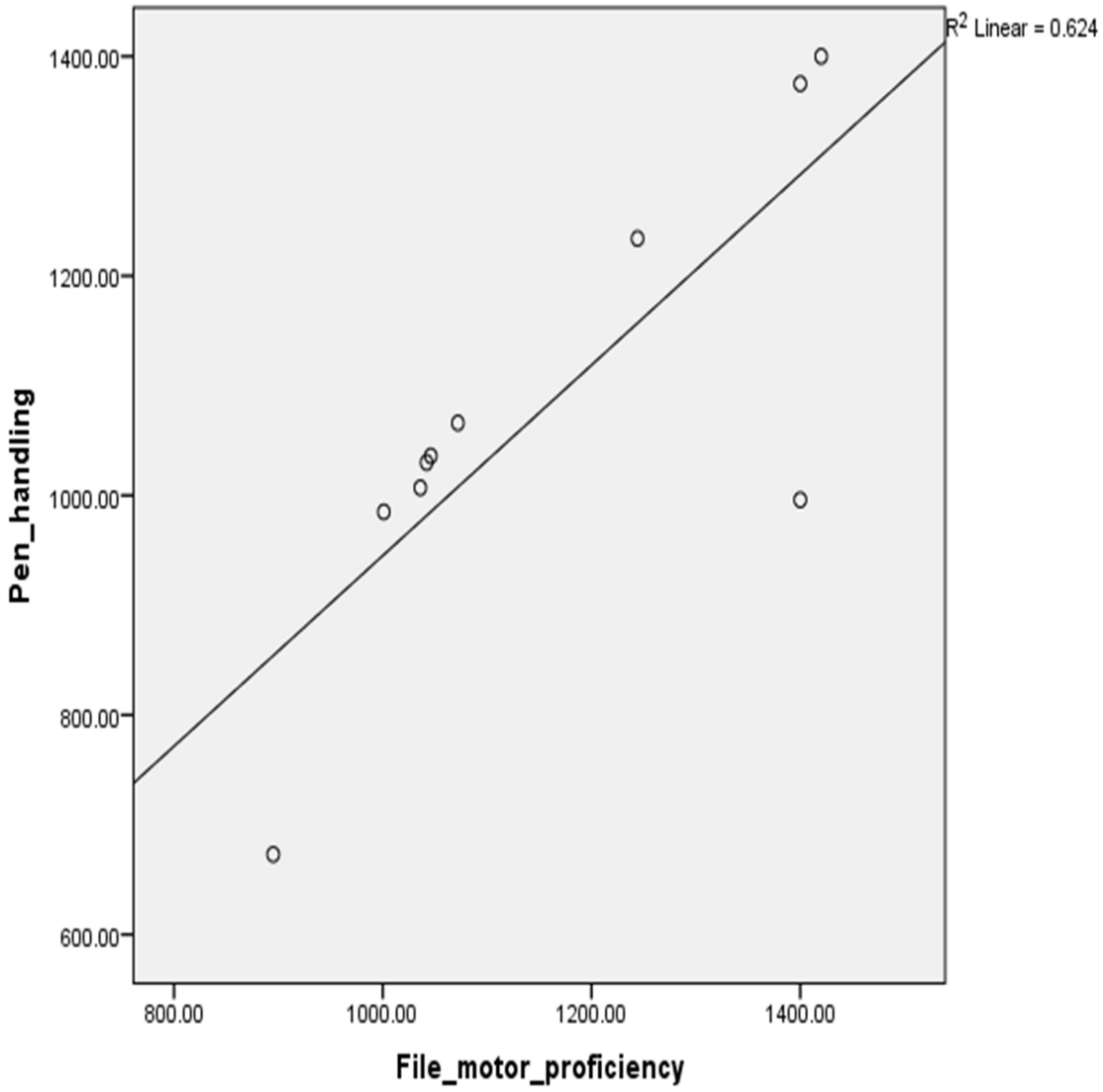
Source: Field Data, 2021

From Table 4.3.2, the constant coefficient is 77.195 and the coefficient of fine motor proficiency is 0.868. From the table, the constant coefficient is β_0 while fine motor's proficiency is β_1. This gives us the equation;

$y= \beta_0 +\beta_1 X$

y= 77.195 + 0.868X where x is the value of fine motor proficiency. This equation is further explained by the scatter graph of a straight line which shows a positive correlation between the variables.

Figure 4.3 Pre-Primary 1 Learners' Fine Motor Proficiency and Pen-handling Scatter Graph



Source: Field Data, 2021

Figure 4.3 shows data that is indicating an upward model as one move from left to right. This displays a positive connection between fine motor proficiency and pen-handling. As fine motor proficiency values increase, the pen-handling values tend to increase. This implies that with increase in fine motor proficiency, there is an increase in pen-handling hence fine motor proficiency has an effect on pen-handling.

These findings concur with those from the interview schedules as supported by teachers reports. Teacher 1:Frequent participation in fine motor improves learners writing outcomes.

Teacher 2: Those learners whose parents' offer fine motor materials tend to have good handwriting as compared to those who are not. Teacher 3: Frequent involvement in fine motor activities such as molding and scribbling improves learners writing skills.

From the observation schedules, it is clear that all schools offer pen-handling activities and all learners benefit from the activities improving their pen-handling. The document analysis results indicate that majority of the preschools have relevant fine motor materials which means that learners are exposed to fine motor which improves their pen-handling. However, a few of the schools have sandpit areas, plain papers, building blocks and other locally made materials which imply that the learners might not perform better in fine motor which may negatively affect their writing outcomes.

In line with the above findings, numerous researches have highlighted the role of fine motor proficiency on learner's pen-handling. For example, Breuhl, C. (2020) studied on the mean duration of children's involvement with muscular resources in the classroom during free play and the effect of direct mediation with small muscle 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 to improvement in name writing performance. This means that fine motor proficiency has an effect on learners writing outcomes.

4.4 Effect of Fine Motor Proficiency on Pre-primary 1 Learners Writing Legibility

The second objective of the study was to determine the effect of fine motor proficiency on pre-primary 1 learners writing legibility in public pre-schools. This study modelled the impact of dexterity proficiency on pre-primary 1 learners writing legibility in public pre-

schools using simple linear regression analysis. In the model, the value of the coefficient indicated pre-primary 1 learners writing legibility where the positive signs of the coefficient indicated increased pre-schoolers writing legibility. The significance of the link between the experimental variable (fine motor proficiency) and the constant variable (writing legibility) was tested at $\alpha=0.05$.

Table 4.4.1: Pre-primary 1 Learners Fine motor Proficiency and Writing Legibility Model Summary

Model	R	R Square	AdjustedR Square	Std. Error of the Estimate
1.	0.719[a]	0.517	0.396	80.20512

a. Predictors: (Constant), Fine

Source: Field Data, 2021

The results in table 4.4.1 outline the correlation between fine motor proficiency and writing legibility where R indicates a strong positive correlation of 0.719. The results of the R Square 0.517 (51.7%) explains the variation between fine motor proficiency and writing legibility where 51.7% of the variation in writing legibility can be explained by fine motor proficiency. This implies that fine motor proficiency has an effect on pre-primary 1 learners writing legibility.

Table 4.4.2: Pre-primary 1 Learners Fine motor Proficiency and Writing Legibility Coefficients[a]

Model	Unstandardized coefficients		Standardized coefficients	T	Sig
	B	Std. Error	Beta		
(Constant)	576.360	2999.371	0.719	1.925	0.127
1.Fine motor proficiency	0.499	0.241		2.068	0.108

a. Dependent Variable: Writing legibility

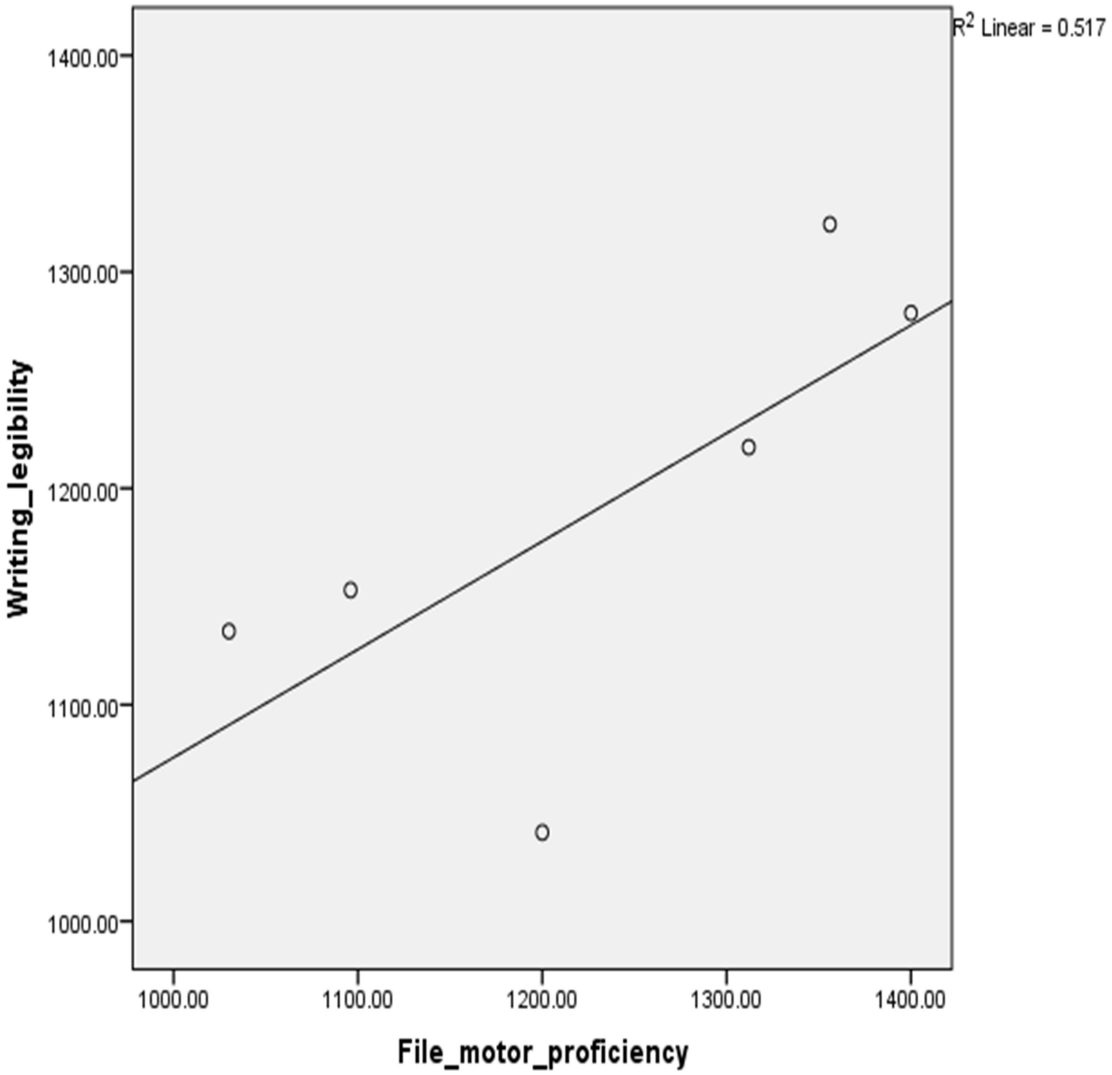
Source: Field Data, 2021

From Table 4.4.2, the constant coefficient is 576.360 and the coefficient of fine motor proficiency is 0.499. From the table, the constant coefficient is β_0 while fine motor's proficiency is β_1.

This gives the equation: $y= \beta_0 +\beta_1 X$

y= 576.360+ 0.499X where x is the value of fine motor proficiency. This equation is further explained by the scatter graph of a straight line which shows a positive correlation between pre-primary 1 learner's fine motor competency and writing legibility.

Figure 4.4: Pre-primary 1 Learners Fine Motor Proficiency and Writing Legibility Scatter Graph



Source: Field Data, 2021

The results of regression analysis in the above scatter graph indicate that the constant of the regression is statistically significant implying that the variables fit in the model were able to predict the outcome variable. The figure shows data that is indicating an upward movement from left to right displaying a positive association between fine motor proficiency and writing legibility. As the fine motor proficiency values increases, writing legibility values also tend to increase. This implies that fine motor proficiency and writing legibility are positively

connected hence with increase in fine motor proficiency; there is also an increase in writing legibility. Therefore, fine motor proficiency has an effect on pre-primary 1 learners writing legibility.

The results of interview schedule support these findings as the teachers-in-charge confirmed. Teacher 4: Learner's involvement in fine motor improves their writing which can be seen in their class work. Teacher 5: With the availability of fine motor skill activities in writing legibility, there is an improved writing outcome among the learners. Moreover, frequent fine motor exercises enhances learners finger muscle flexibility which results into proper writing. Moreover, from the observation schedules and document analysis guide, it was clear that learners who were subjected to dexterity occurrences had flexible hand muscles with good handwriting as compared to those who were not.

Similar findings that concur with the above findings were established in various studies such as a study done by Seo (2018) which showed that learners handwriting legibility was correlated since the association between smooth muscles and legibility were connected with fine motor distinction (r=0.78). Another study done by Akin (2019) demonstrated that legible writing difficulties indicated inadequate fine motor domination.

4.5 Relationship Between Fine Motor Proficiency and Pre-primary 1 Learners Letter Formation

The third objective of the study was to determine the relationship between fine motor proficiency and pre-primary 1 learner's letter formation in public preschools. The objective had a null hypothesis. This study modelled the link joining fine motor excellence and learner's letter formation in public pre-schools using simple linear regression analysis. Hypothesis testing was done using the Anova test. In the model, the value of the coefficient indicates pre-primary 1 learner's letter formation where the positive signs of the coefficient

indicated increased pre-primary 1 learner's letter formation. The significance conjoining the experimental variable (fine motor proficiency) and the constant variable (letter formation) was tested at $\alpha=0.05$.

Table 4.5.1: Pre-primary 1 Learners Fine motor Proficiency and Letter Formation Model Summary

Model	R	R Square	Adjusted R	Std Error of the Estimate
1	0.888[a]	0.789	0.683	82.26622

a. Predictors (Constant), Fine motor proficiency

Source: Field Data, 2021

The results in table 4.5.1 outline the correlation between fine motor proficiency and letter formation where R indicates a strong positive correlation of 0.888. The results of the R Square 0.789 (78.9%) explains the variation between the fine motor proficiency and letter formation where 78.9% of the variation in letter formation can be explained by fine motor proficiency. This implies that there is a correlation between fine motor skilfulness and pre-primary 1 learner's letter formation.

Table 4.5.2: Pre-primary 1 Learners Fine motor Proficiency and Letter Formation

Coefficients[a]

Model	Unstandardized coefficients		Standardized coefficients	T	Sig
	B	Std. Error	Beta		
(Constant)	449.219	261.236		1.720	0.228
1.Fine motor proficiency	0.620	0.227	0.888	2.733	0.11

a. Dependent Variable: Letter formation

Source: Field Data, 2021

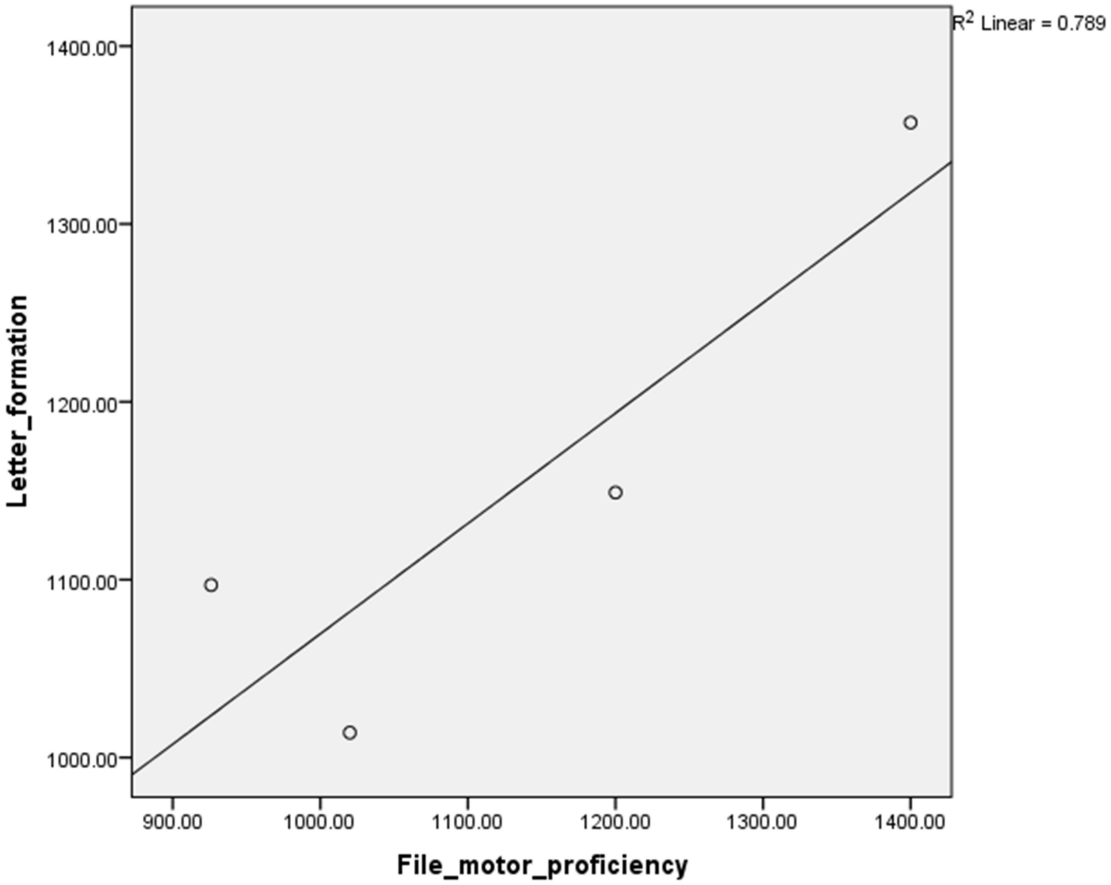
From Table 4.5.2, the constant coefficient is 449.219 and the coefficient of fine motor proficiency is 0.620. From the table, the constant coefficient is β_0 while fine motor proficiency is β_1.

From the table we get the equation: $y= \beta_0 +\beta_1 X$

$y= 449.219 + 0.620X$ where x is the value of fine motor proficiency.

This equation is further explained by the scatter graph which gives a positive correlation. This is represented on the scatter graph which shows a straight line indicating a positive correlation in letter formation and fine motor competency.

Figure 4.5: Fine Motor Proficiency and Letter Formation Scatter Graph



Source: Field Data, 2021

The results of the regression analysis in the above scatter graph indicate that the constant of the regression is statistically significant implying that the variables fit in the model were able to predict the outcome variable. The data of the scatter graph is showing an uphill pattern as one move from left to right. This indicates a positive relationship between fine motor proficiency and letter formation. As the fine motor proficiency values increase, letter formation values also tend to increase indicating a connection between fine motor proficiency

and letter formation because with increase in fine motor proficiency; there is also an increase in letter formation.

Table 4.5.3: Anova Analysis

Model		Sum of Squares	df	Mean Squares	f	Sig
Regression		50547.290	1	50547.290	7.4690.112[b]	
1.	Residual	13535.750	2	6767.730		
	Total	64082.750	3			

a. Dependent Variable: Letter formation

b. Predictors: (Constant), Fine motor proficiency

Source: Field Data, 2021

Table 4.5.3 shows the Anova results which tested for the differences between the means of the two data set to get the results of the hypothesis. From the table, Since the computed value is greater than the alpha value (P>α), we rejected the null hypothesis concluding that there is a positive relationship between fine motor proficiency and letter formation.

Table 4.5.4: Pearson Correlations

		Letter formation	fine motor proficiency
Letter formation	Pearson correlation	1	0.701
	Sig (2-tailed)		0.299
	N	4	4

Fine motor	Pearson correlation	0.701	1
Proficiency	Sig (2-tailed)	0.299	
	N	4	4

Source: Field Data

From table 4.5.4 above, the Pearson correlation coefficient is 0.701. this coefficient showed that there is a strong positive relationship between letter formation and fine motor proficiency.

The study findings are in line with various studies such as a study done by Clark, G.J. (2010) which found similar findings where significant correlations existed among writing and fine motor skills for kindergarteners. Another study by Exner (2005) established statistical significant positive relationships between in-hand manipulation and letter formation which supported previous studies where inadequate in-hand expertise was found to tamper with letter formation during writing. Similarly, Seo (2018) tried to investigate the impact of smooth muscle happenings on legible writing in pre-schoolers. To establish handwriting legibility, a Korean alphabet writing evaluation test was used to determine fine motor expertise and the research outcomes unveiled an association joining dexterity and readable writing. Also, other researchers have established that writing exercises are familiar strategies utilised in children's fine motor skills. Moreover, a study done by Dayan & Cohen (2011); Wilhelm & Born (2012) also argued that a play activity that allows learners a chance to display their smaller muscle expertise through pen holding as well as drawing is the writing exercise.

Table 4.6: Pre-primary 1 Learners by Gender

Ward	Male	Female
Murhanda	38	40
Isukha East	30	32
Isukha West	30	33
Isukha North	26	27
Isukha South	30	23
Isukha Central	31	30
Total	**185**	**185**

Source: Field Data, 2021

The information in Table 4.6 indicates that there were 38 male and 40 female pre-primary 1 learners in Murhanda ward, 30 male and 32 female pre-primary 1 learners in Isukha East, 30 male and 33 female pre-primary 1 learners in Isukha West, 26 male and 27 female pre-primary 1 learners in Isukha North, 30 male and 23 female pre-primary 1 learners in Isukha South, and 31 male and 30 female pre-primary 1 learners in Isukha Central. This implies that

there is gender balance in pre-primary learners where all learners can benefit from fine motor activities to enhance their writing outcomes. These findings are not agreeing with Odour's (2019) study which found variations in pre-schooler's gender suggesting that only females are ready to learn than their male counterparts.

Table 4.7: Parents Date of Assessment

Ward	Date
Murhanda	5/7/2021
Isukha East	6/7/2021
Isukha West	7/7/2021
Isukha North	8/7/2021
Isukha South	9/7/2021
Isukha Central	12/7/2021

Source: Field Data, 2021

Parents in the 6 wards were assessed between 5/7/2021 to 12/7/2021 where Murhanda ward was on 5/7/2021, Isukha East was on 6/7/2021, Isukha West was on 7/7/2021, Isukha North was on 8/7/2021, Isukha South on 9/7/2021, and Isukha Central on 12/7/2021. This indicated that there was no collusion on collection of data and there was no bias as the respondents had

no time to share the research information prior to the assessment date which resulted in valid data findings by the researcher.

Table 4.8: Pre-primary 1 Learner's by Date of Birth

Date of Birth	Count	Percentage
2015	30	8.12%
2016	132	35.68%
2017	152	41.08%
2018	56	15.14%

Source: Questionnaires, 2021

Table 4.8 outlines pre-primary 1 learner's date of birth. The table implies that a few learners are 6 years old. At this age, the learners are supposed to be in grade one thus they are very fluent in writing outcomes because there are of mature age. Learners who are 5 years old are a bit slow in writing fluency as compared with their 6-year-old counterparts because they are still struggling to develop their fine motor proficiency. From the table 15.14% of the learners are below 4 years which means they are still new from home. These learners are struggling with school readiness and settling hence have poor fine motor proficiency which has got a negative impact on their writing outcomes. As indicated from the table, most of the pre-

primary 1 learners are 4 years which is the appropriate age for this group of learners. At this age, learners are ready to learn as they have settled in school and their writing muscles have developed through dexterity exercise like drawing, tracing, and joining of dots. At this age, the learners were able to demonstrate a positive fluency in fine motor proficiency which was reflected in their writing outcomes which has an implication of good handwriting.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

The purpose of the study was to establish the influence of fine muscle experiences on writing outcomes of learners in Kakamega East sub-county. Therefore, the present study summarized the research findings along the themes; it presents a summary of the study findings, the conclusion reached at as well as the recommendations made. Finally, the suggestions for further research are given.

5.2 Summary of Research Findings

This section presents the summary of research findings as established in chapter four. The section presents a summary of the demographic data for the respondents in section 5.2.1 as well as the research findings.

5.2.1 Response Rate

The findings indicate that the study had a response rate of 96.10%. Hence, the high turnout of respondents can be as a result of a well-organized information gathering procedure.

5.2.2 The Effect of Fine Motor Proficiency on Pen-handling Among Pre-Primary 1 Learners

The linear regression analysis results indicated that pen-handling variables ;exercising with play dough continuously, involvement in in-hand manipulation activities, holding the pencil with a tripod grasp among others were important in outlining 62.4% of the variation in fine motor proficiency. From the observation schedules, it is clear that most of the learners are exposed to a variety of fine motor activities although they lack relevant resources and materials. Also, there is inadequate time allocated for the same which has an effect on learner's fine motor proficiency. From the interview schedules, teachers-in-charge expressed their concern in terms of materials and resources fostering pen-handling as they claimed to have limited resources. Therefore, this study established that fine motor proficiency is significant in enhancing learners pen-handling and teachers must ensure sufficient and frequent fine motor skill activities to improve on learner's pen-handling. They should also offer age-appropriate fine motor materials such as crayons, plasticines, chalks, pencils, water paints, exercise books and pictures to enhance learner's fine motor proficiency which improves the writing outcomes.

5.2.3 Effect of Fine Motor Proficiency on Writing Legibility Among Pre-Primary 1 Learners

The linear regression analysis results showed that writing legibility variables; positive attitude towards writing, concepts about print stable in-hand manipulation, proper letter shaping and forming, motor visual coordination, and early writing skills were significant in

describing 51.7% of the variation in fine motor proficiency. Also, the interview, observation and document analysis results showed a relationship between fine motor and writing. This study therefore established that fine motor proficiency influences pre-primary 1 learners writing legibility in public preschools. It was established that fine motor proficiency is key in enhancing writing legibility implying that early writing skills of learners must be put into consideration. Moreover, teachers must offer varied fine motor resources and activities to enhance learner's fine motor skills which promote their writing outcomes.

5.2.4 The Relationship Between Fine Motor Proficiency and Letter Formation Among Pre-Primary 1 learners

The linear regression analysis results showed that the variables of letter formation; learners' involvement in letter formation activities, availability of letter formation activities, availability of materials fostering letter formation, and assessment of learner's letter formation by teachers were statistically significant in explaining 78.9% of the variations in pre-primary 1 learners fine motor proficiency. From the observation, interview, and document results, it was clear that presence of adequate fine motor materials and activities improved learner's fine motor proficiency which improved their writing outcomes. Therefore, it is important for learners to be involved in letter formation activities as well as be provided with adequate fine motor materials to improve their writing outcomes. Teachers must also assess learner's letter formation activities to improve on the same.

5.3 Conclusions

The study sought to explore pre-primary 1 learner's writing outcomes under the influence of fine motor skillfulness as a predictor of writing outcome. Three factors that were investigated into are: pen-handling, writing legibility, and letter formation. The qualitative instruments indicated that fine motor proficiency has an effect on writing outcomes as seen in pre-primary 1 learners' work. The learners who could draw, join dots and color appropriately demonstrated positive writing outcomes as compared to their peers who were not exposed to the same activities. This is clearly evident from the observation checklists as seen by the researcher. From the scatter graphs presented, a connection exists between fine motor proficiency and pen-handling as seen in the steepness of the graph followed by letter formation and then writing legibility. It was then concluded that fine motor proficiency has a positive correlation on the three variables with the strongest one being pen-handling, followed by letter formation, and then writing legibility. Therefore, fine motor proficiency played a great role towards pre-primary 1 learners writing outcomes and the following conclusions were made.

`5.3.1 Effect of Fine Motor Proficiency on Pen-handling

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 among others in pre-primary 1 were statistically significant to fine motor proficiency at 62.4% level. The findings are in line with those from observations, document analysis guide and interviews which identified a link joining fine muscles and pen-handling. It was concluded that pre-primary 1 learners pen-handling in public preschools was positively predicted by the selected fine motor proficiency learning and teaching variables such as pasting, coloring, cutting, tracing, joining dots among others.

5.3.2 Effect of Fine Motor Proficiency on Writing Legibility

The linear regression analysis results showed that selected writing legibility variables (positive attitude towards writing, concepts about print, stable in-hand manipulation, proper letter shaping and forming, motor visual coordination, and early writing skills) in pre-primary 1 were statistically significant to pre-primary 1 learner's fine motor proficiency at 51.7% level. The findings are similar with those from the document analysis guide, interviews and observation which unveiled that small muscle excellence impacts writing legibility. It was concluded that pre-primary 1 learner's writing legibility in public preschools was positively predicted by the selected fine motor proficiency learning and teaching variables.

5.3.3 Relationship Between Fine Motor Proficiency and Letter Formation Among Pre-Primary 1 learners in Kakamega East sub-county, Kakamega County, Kenya.

The linear regression analysis results showed that selected letter formation variables (learners' involvement in letter formation activities, availability of letter formation activities, availability of materials fostering letter formation, and assessment of learners' letter formation by teachers) in pre-primary 1 were statistically significant to pre-primary 1 learners fine motor proficiency at 78.9% level. Moreover, from the Anova results and the Pearson correlation, we rejected the null hypothesis. These findings correlate with the interview, document analysis guide and observation results which identified an association between formation of letters and dexterity. It was concluded that pre-primary 1 learners letter formation in public preschools was positively predicted by the selected fine motor

proficiency learning and teaching variables such as scribbling, pasting and painting, joining dots, coloring, drawing, cutting, matching and pairing among others.

5.4 Recommendations

The following recommendations were made from the conclusions drawn from the themes under the main three objectives of the study.

The linear regression analysis results showed that the selected pen-handling variables such as exercising with play dough continuously, involvement in in-hand manipulation activities, holding the pencil with a tripod grasp among others 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.

The linear regression analysis results showed that the selected writing legibility variables (positive attitude towards writing, concepts about print, stable in-hand manipulation, proper letter shaping and forming, motor visual coordination, and early writing skills) were statistically significant with fine motor proficiency at 51.7% level. It therefore recommended that preschool teachers should come up with relevant materials and activities that help in the enhancement of pre-school learners' fine motor proficiency that later on enhances their writing outcomes.

The linear regression analysis results showed that the selected letter formation variable (learners' involvement in letter formation activities, availability of letter formation activities, availability of materials fostering letter formation and assessment of learner's letter formation

by teachers) in pre-primary 1 were statistically significant with fine motor proficiency at 78.9% level. The study therefore recommended that the County Government of Kakamega should organize trainings and seminars to equip preschool teachers with relevant skills to enhance learners writing outcomes.

5.5 Suggestions for Further Research

This study suggested the following areas for further research.

i. Research on recognition of locally available play materials.

ii. A study on sensitization of parents and training on engagement of children in fine motor activities such as tying laces, picking up small objects while at home among others.

iii. A study on preschooler's gross motor and handwriting among learners in public and private preschools in Kenya.

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APPENDICES

Appendix I: Informed Consent

Title: Fine motor proficiency as a predictor of writing outcomes among pre-primary 1learners in Kakamega East sub-county, Kakamega County, Kenya.

My name is Khaseyi Gillian. I am a Masters student in Early Childhood Education at Masinde Muliro University of Science and Technology (MMUST). I am carrying out a study to determine fine motor competency as a determinant of writing outcomes among pre-primary 1 learners. This study aims at offering solution to the rising problems in handwriting of preschool children.

If you agree to participate in this study by signing in the blank space provided below, you will be required to fill in the questionnaires and respond to the interview questions and the findings of the study will be used for academic purposes.

Confidentiality: With exclusion of some exceptions outlined below, you have the total right to the confidentiality of your responses. I will always act to protect your privacy even if you do release me in writing to share information about you. You may direct me to share information with whomever you chose, and you can change your mind and revoke that permission at any time.

Complaints: If you're unhappy with the settings of the questions in the questionnaires and the interview schedules, I hope you will discuss with me so that I can react to your needs. I will seriously take such reprove with respect and care. If you have any concerns that will not be addressed or that my conduct has been unfair, you can disclose it to my supervisor Dr. Rose Opiyo of 0720926862.

Signed: _____Date: _____

Appendix II: Informed Consent for Parents

PARTICIPANT'S CODE:

My name is Khaseyi Gillian and I'm a researcher from Masinde Muliro University of Science and Technology (MMUST). I am conducting a study titled ''Fine motor proficiency as a predictor of writing outcomes among pre-primary 1 learners in Kakamega East subcounty, Kakamega county, Kenya.

Procedures to be followed

Participation in this study will require that I ask you respond to the questions in the questionnaire.

You have the right to refuse participation in this study. You will get the same services and care whether you agree to join the study or not and your decision will not change the care you will receive. Please remember the participation in this study is voluntarily. You may ask questions related to the study at any time.

Confidentiality

The questionnaires will be answered in a private setting. Your name will not be recorded on the questionnaire. The questionnaires will be kept safe and only be used for the purposes of the study.

Participant's statement

The above information regarding my participation in the study is clear to me. The study has been explained to me and I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time.

Name of Participant……

Signature or Thumbprint _____ Date_____

Researcher's statement

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved.

NameofInterviewer
……

Signature _____ Date_____

INFORMED CONSENT
(Translation to Swahili)
UKUBALI WA TAARIFA

MSHIRIKI CODE:

Jina langu ni Khaseyi Gillian. Na mimi ni mtafiti kutoka chuo kikuu cha Masinde Muliro (MMUST). Ninafanya utafiti uliopewa jina la "**Fine motor proficiency as a predictor of writing outcomes among pre-primary 1 learners''** katika kaunti ya Kakamega.

Taratibu zinazopaswa kufuatwa
Kushiriki katika utafiti huu kutahitaji ujibu maswali kadhaa.

Usiri
Mahojiano yatafanyika kwa faragha. Jina lako halitarekodiwa kwenye dodoso. Maswali yatahifadhiwa kwa minajili ya kutimiza malengo ya utafiti.

Taarifa ya mshiriki
Maelezo hapo juu kuhusu ushiriki wangu katika utafiti ni wazi kwangu. Utafiti umeelezwa kwangu na nimepewa nafasi ya kuuliza maswali na maswali yangu yamejibiwa kwa kuridhika kwangu. Kushiriki kwangu katika utafiti huu ni kwa hiari kabisa. Ninaelewa kuwa rekodi zangu zitahifadhiwa kwa faragha na kwamba ninaweza kuondoka kwenye masomo wakati wowote.

JinalaMshiriki
……

Saini au Thumbprint/kidole _____
Tarehe_____

Kauli ya mtafiti
Mimi, aliyesainiwa chini, nimemuelezea kujitolea kwa lugha ambayo anaelewa, taratibu zinazopaswa kufuatwa katika utafiti na hatari na faida zinazohusika.

JinalaMhojiji
……

Saini _____ Tarehe_____

APPENDIX III: Permission Letter to Collect Data

Masinde Muliro University

Box 191-50100

Kakamega

Kenya

To The Parent

Through

Pre-school Teacher-in charge of..... Pre-School

Kakamega East sub-county

Dear Parent/Guardian

RE: REQUEST FOR THE PARENT TO TAKE PART IN THE STUDY

I am a masters student at Masinde Muliro University of Science and Technology (MMUST) and I wish to conduct a study in which your son/daughter's pre-school fine motor skills and writing outcomes will be assessed in the third term of 2021. The purpose of the study is to determine fine motor proficiency as a predictor of writing outcomes among pre-primary 1 learners in Kakamega East Sub-County, Kakamega County, Kenya.

The assessment will take 30 minutes and will be done at the convenience of the parent at the comfort of their homes. To help me, I request that you respond to the items in the Parent's questionnaire. I promise to keep the responses confidential. Please note that you can withdraw yourself from participating in this study if you feel uncomfortable.

I have read and understood the intention and purpose of this study. Please (tick)

I agree [ ] I Disagree [ ]

That I will participate in the study

Signature..... Parent's Name.....

Contact and Email..... For more information contact me on.....

APPENDIX IV: QUESTIONNAIRE

NAME OF PRESCHOOL: .....

SECTION 1: INTRODUCTION AND CONSENT FROM THE RESPONDENT

Good morning/afternoon/evening parent. You have been proportionately sampled from 385 parents in Kakamega East Sub-County to participate in the research study. You are therefore requested to fill the questionnaire. The data you provide will not cause any disadvantage to you and will be kept confidential and used only by the researcher for the purpose of this study. The data will then be summarised and reported in aggregate terms. If you accept to complete this questionnaire, you will be doing so voluntarily and the researcher appreciates your time. The parent's fine motor proficiency and writing outcomes questionnaire is self-administered and you are requested to be as forthright and as honest as possible with your responses. It will take you about 40 minutes to complete the questionnaire. For anonymity, please do not indicate your name on this checklist.

1.1 Would you like to participate in the survey?

Ungependa kushiriki katika utafiti?

1=YES ( ) 2=NO ( )

NDION( ) LA ( )

[IF YES PROCEED TO SECTION 2]

[KAMA NDIO NENDA SEHEMU YA PILI]

1.2 Kindly indicate why you do not wish to participate in this survey

Tafadhali eleza mbona hutoshiriki katika utafiti

1= DO NOT HAVE TIME ( ) 2= NOT INTERESTED ( ) 3=OTHER (Specify).....

1= SINA MUDA ( ) 2= SINA HAJA ( ) 3= MENGINE……

[IF 1.1 IS NO, RETURN THE QUESTIONNAIRE TO THE SURVEY TEAM]

[KAMA 1 NI LA, RUDISHA KARATASI LA MASWALI KWA WATAFITI]

In section 2-5, indicate the pre-primary 1 learners' competency score with a mark ranging from 1-5b as follows: 5=Excellent; 4=Very Good; 3=Good; 2=Satisfactory; 1=Fair.

SECTION 2: FINE MOTOR PROFICIENCY AND PEN-HANDLING

Indicate the pre-primary 1 learners competency score with a mark ranging from 1-5 (5=Excellent; 4=Very Good; 3=Good; 2=Satisfactory; 1=Fair.)

2.1 Exercising with play dough continuously/ Kucheza na udongo kila mara

[ ].

2.2 Involvement in in-hand manipulation activities/ kushiriki katika michezo inayohusiana na vidole [ ].

2.3 Holding the pencil with a tripod grasp/ kushika kalamu ipaswavyo

[ ].

2.4 Colouring an entire picture/ kupaka mchoro rangi

[ ].

2.5 Writing their name/ kuandika majina yao

[ ].

2.6 Tracing on a line with control/kuandika chini ya laini vikamilifu

[ ].

2.7 Copying numbers 1-5/ kuandika nambari 1-5

[ ].

2.8 Copying simple pictures using geometric shapes / kuchora michoro rahisi ipasavyo [ ].

2.9 Independently attempting to draw a range of pictures/ kuchora michoro tofauti tofauti bila kusaidiwa [ ]

2.10 Cutting out simple shapes/ kukata alama mbalimbali [ ].

2.11Materials promoting fine motor/ vifaa vya kuendeleza usawa wa misuli ya vidole [ ].

2.12 Learners involvement in fine motor/ wanafunzi kujihusisha na misuli ya vidole [ ].

2.13 Time allocation for fine motor/ muda uliopewa kwa manufaa ya misuli ya vidole [ ].

2.14 Learners attitude towards fine motor activities/ wanafunzi kupenda mazoezi ya misuli ya vidole [ ].

2.15 Learners hand manipulation/ wanafunzi kujihusisha na mazoezi ya vidole [ ].

2.16 Pasting/ kupaka rangi [ ].

2.17 Colouring/ upakaji wa rangi [ ].

2.18 Joining dots/kuunganisha michoro [ ].

2.19 Drawing/ kuchora [ ]

2.20 Sub-Total [ ]

SECTION 3: FINE MOTOR PROFICIENCY AND WRITING LEGIBILITY

Indicate the pre-primary 1 learners competency score with a mark ranging from 1-5 (5=Excellent; 4=Very Good; 3=Good; 2=Satisfactory; 1=Fair.)

3.1 Positive attitude towards writing/ kupenda kuandika [ ].

3.2 Concepts about print/ mafunzo kuhusu uandishi [ ].

3.3 Stable in-hand manipulation/ kushughulika na vidole ipasavyo [ ].

3.4 Proper letter shaping and forming/ kuandika silabi vizuri [ ].

3.5 Motor-visual coordination/ ubora wa kutumia macho na mkono [ ].

3.6 Early writing skills/ uandishi wa mapema [ ].

3.7 Cutting/ kukata [ ].

3.8 Use of paper punch/ matumizi ya kifaa cha kutoboa mashimo kwenye karatasi

[ ].

3.9 Holding small items with tweezers/ kushika vifaa vidogo vidogo ukitumia makasi

[ ].

3.10 Making mosaic from thick papers/kutengeneza michoro kutumia makaratasi mazito

[ ].

3.11 Playing with doughs/ kucheza na udongo [ ].

3.12 Proper tracing/ kuandika chini ya laini vizuri [ ].

3.13 Sub-Total [ ].

SECTION 4: FINE MOTOR AND LETTER FORMATION

Indicate the Learner's Competency score with a mark ranging from 1-5

(5=Excellent; 4=Very Good; 3=Good; 2=Satisfactory; 1=Fair).

4.1 Learners involvement in letter formation activities/ wanafunzi kujihusisha na mazoezi ya uandishi bora [ ].

4.2 Availability of letter formation activities/ uwepo wa mazoezi ya uandishi bora

[ ].

4.3 Availability of materials fostering letter formation/ uwepo wa vifaa vya kusaidia katika uandishi bora [ ].

4.4 Assessment of learners' letter formation by teachers/ walimu kuchunguza uandishi wa wanafunzi [ ].

4.5 Cutting on a straight line/ kukata kwa laini ipasavyo

[ ].

4.6 Tracing/ kuchora chini ya laini [ ].

4.7 Joining dots/ kuunganisha michoro [ ].

4.8 Pasting/ kupaka rangi [ ].

4.9 Sub-Total [ ].

SECTION 5: FINE MOTOR PROFICIENCY

Indicate the pre-primary 1 learners competency score with a mark ranging from 1-5 (5=Excellent; 4=Very Good; 3=Good; 2=Satisfactory; 1=Fair.)

5.1 Materials promoting fine motor proficiency/vifaa vya kuendeleza misuli ya vidole

[ ].

5.2 Learner's involvement in fine motor activities/ wanafunzi kujihusisha na mazoezi ya misuli ya vidole [

].

5.3 Teacher's involvement in learner's fine motor activities/ walimu kujihusisha na misuli ya vidole vya wanafunzi [ ].

5.4 Learner's attitude towards fine motor/ wanafunzi kupenda misuli ya vidole [ ].

5.5 Learner's hand manipulation/ wanafunzi kujihusisha na mazoezi ya mikono [ ].

5.6 Pasting/ kupaka rangi [ ].

5.7 Joining dots/ kuunganisha michoro [ ].

5.8 Drawing/ kuchora [ ].

5.9 Use of paper punch/ matumizi ya kifaa cha kutoboa mashimo kwenye karatasi [ ].

5.10 Making mosaics/ kutengeneza michoro kutumia bidhaa mbalimbali [ ].

5.11 Time allocation for fine motor activities/ muda uliopeanwa kwa mazoezi ya misuli ya vidole [ ].

SECTION 6: PRE-PRIMARY 1 LEARNER'S BACKGROUND INFORMATION

Fill in the pre-primary 1 learner's background information below

5.1 Date of assessment (**DD/MM/YY)** [ ].

5.2 Date of birth (**DD/MM/YY**) [ ].

5.3 Learner's gender [ ].

Congratulations and thank you

PARTICIPANTS CODE:	
AGE:	
SEX:	
ROLE:	
TEACHING EXPERIENCE (IN YEARS) :	

APPENDIX V: TEACHERS-IN CHARGE INTERVIEW SCHEDULE
SECTION 1: INTRODUCTION AND CONSENT FROM RESPONDENT

Good morning/afternoon/evening sir/madam. You have been purposively sampled from 6 preschool teachers-in-charge in Kakamega East sub-county to participate in the research survey. The data you provide will not cause any disadvantage to you and it will not be disclosed to any one and used only by the researcher for the purpose of this study. Data will be summarised and reported in aggregate terms. If you accept to participate in this interview, you will be doing so voluntarily and the researcher appreciates your time. The interview will take about 20 minutes to complete.

1.1Would you like to participate in the interview? Yes ( ) No ( ).

[If Yes, proceed to section 2]

1.3 Kindly indicate the reason why you would not wish to participate in the interview?

1= DO NOT HAVE TIME ( ); 2= NOT INTERESTED ( ); 3= OTHER (specify).....

[**If 1.1 is NO, return questionnaire to the survey team]**

SECTION 2: PRE-PRIMARY 1 WRITING OUTCOMES (pen-handling, writing legibility, and letter formation)

2.1Indicate the total number of pre-primary 1 learners in your school and the total number of course books in writing activities

3.1 Does your school offer pen-handling activities such as cutting and drawing?

3.2 if yes do all the pre-primary 1 learners benefit from the fine motor and pen-handling activities and are the pen-handling activities changed regularly?

3.3 Are the teachers fully involved in the pre-primary 1 learner's pen-handling activities and what kind of fine motor relevant materials are available?

3.4 How does the consistency of fine motor activities support learners' pen-handling?

3.5 What are some of the fine motor activities used to foster writing legibility among pre-primary 1 learners?

3.6 How often do learners participate in writing legibility activities?

3.7 How are the teachers involved in learners' writing legibility?

3.8 What are some of the activities that are done to foster fine motor and improve letter formation?

3.9 How often are pre-primary 1 learners involved in letter formation activities and what are some of the materials used to foster letter formation?

4.0 When are learners involved in letter formation activities and how are they assessed?

APPENDIX VI: OBSERVATION SCHEDULE

In this section, the teacher will assess on the influence of fine motor proficiency on pre-primary 1 learners writing outcomes and score them with a mark ranging from 1-5 (5=Excellent; 4=Very Good; 3= Good; 2=Satisfactory; 1=Fair)

1.1 Availability of materials that foster fine motor proficiency [ ].

1.2 Learners involved in fine motor proficiency activities [ ].

1.3 Time allocation for fine motor skill activities [ ].

1.4 Learners attitude towards fine motor skill activities [ ].

1.5 Learners proper pencil grasp during writing [ ].

1.6 Legible writing [ ].

1.7 Stable in-hand manipulation [ ].

1.8 Learners proper paper stabilization [ ].

1.9 Proper letter shaping and formation [ ].

1.10 Activities fostering fine motor proficiency

- Proper pencil grasp [ ].
- Proper tracing [ ]
- Cutting on a straight line [ ]
- Joining dots [ ]
- Pasting [ ]
- Drawing [ ].
- Colouring [ ].
- Name writing [ ].

Proper motor-visual coordination [ ]

Learners assistance from teachers during writing [ ].

APPENDIX VII: DOCUMENT ANALYSIS GUIDE

1. The pre-school filled TSC information on teachers forms for term 1, 2, and 3 2021.
2. The pre-primary 1 class register for Term 1, 2, and 3 in 2021.
3. Pre-primary 1 observation checklist

Resource	**Available**	**Not available**	**Adequate Quantity**	**Inadequate Quantity**	**Accessible**	**Inaccessible**
Text books						
Writing materials						
Drawing books						
Crayons						
Plasticines						
Plain papers						
Pencils						
Playground						
Sand pit area						
Building blocks						

APPENDIX VIII: KSRAT TOOL

MINISTRY OF EDUCATION

KENYA SCHOOL READINESS ASSESSMENT TOOL (KSRAT)

TARGET GROUP- 4 YEARS

GENERAL INFORMATION

1. School/ECDE Centre: _____
2. Educational Zone: _____
3. District: _____
4. Date of Assessment: _____
5. Name of Child: _____
6. Date of Birth: (As per the birth certificate or clinic card)

Date	Month	Year

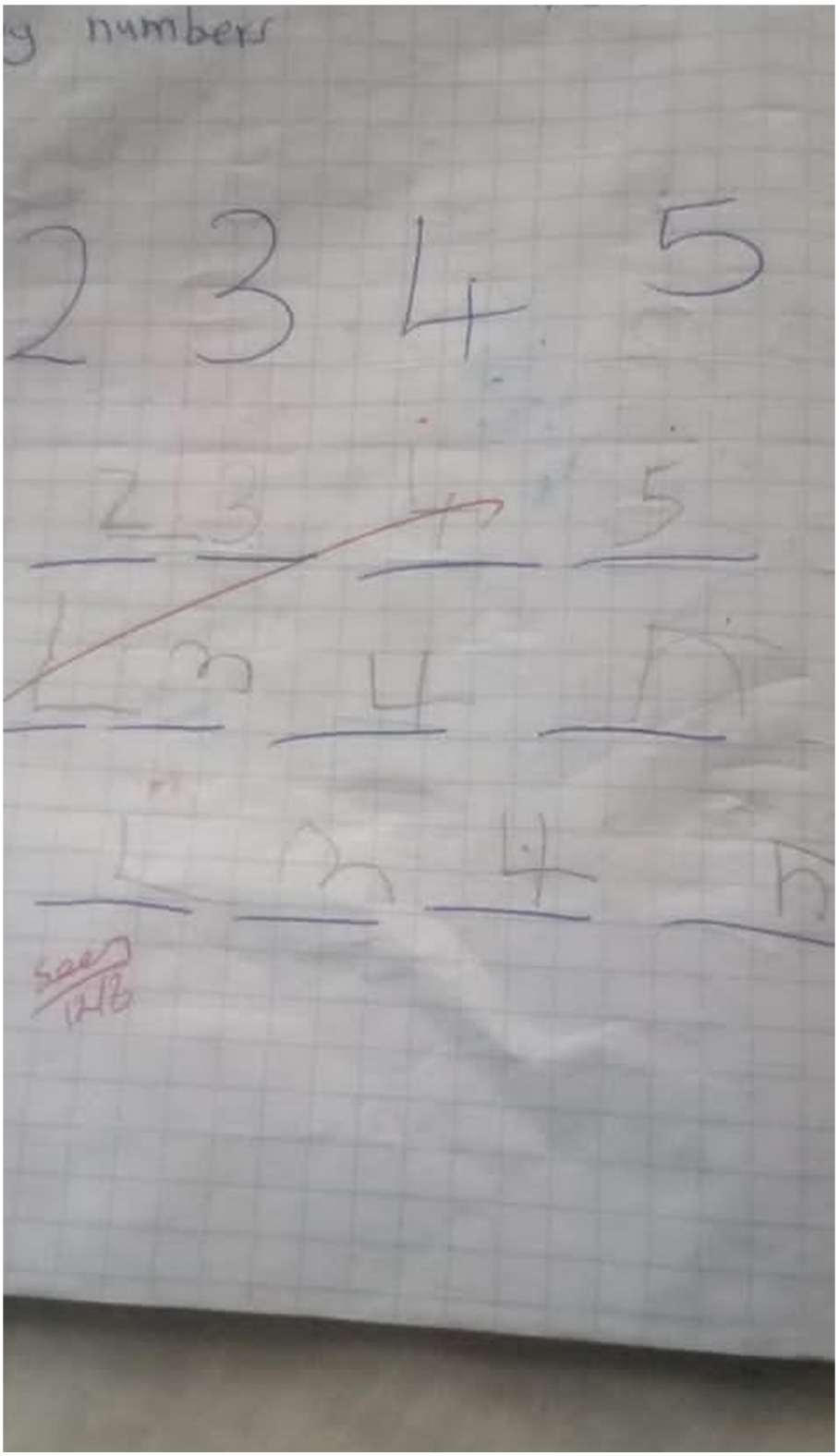
Gender F [ ] M [ ]

A1: Fine Motor Competencies

	Rate of the child's ability to:	**Enter the rating number appropriately in the box under each category**				
		Excellent (5)	**Better (4)**	**V. Good(3)**	**Good (2)**	**Fair (1)**
1.1	Playing with dough continuously					
1.2	In-hand manipulation					
1.3	Holding the pen with a tripod stand					
1.4	Proper pen-handling					

1.5	Writing legibility					
1.6	Proper letter formation					
	Sub-Total Score					

APPENDIX IX: PRE-PRIMARY 1 LEARNERS WORK SAMPLES


y numbers
2 3 4 5

APPENDIX X: APPROVAL OF PROPOSAL

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

Tel: 056-30870
Fax: 056-30153
E-mail: directordps@mmust.ac.ke
Website: www.mmust.ac.ke

P.O Box 190
Kakamega – 50100
Kenya

Directorate of Postgraduate Studies

Ref: MMU/COR: 509099

24th May, 2021

Khaseyi Gillian,
EDH/G/01-53698/2019,
P.O. Box 190-50100,
KAKAMEGA.

Dear Ms. Khaseyi,

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your Masters proposal entitled: ***"Fine Motor Proficiency as a Predictor of Early writing outcomes among Pre-Primary 1 learners in Kakamega East Sub County, Kakamega County, Kenya"*** and appointed the following as supervisors:

1. Dr. Otieno Kenneth – SEDU, MMUST
2. Dr. Rose Atieno Opiyo - SEDU, MMUST

You are required to submit through your supervisor(s) progress reports every three months to the Director Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Education Graduate Studies Committee and Chairman, Educational Psychology Department. Kindly adhere to research ethics consideration in conducting research.

It is the policy and regulations of the University that you observe a deadline of two years from the date of registration to complete your Masters thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

Dr. Consolata Ngala
DEPUTY DIRECTOR, DIRECTORATE OF POSTGRADUATE STUDIES

APPENDIX XI: MAP OF KAKAMEGA EAST SUB-COUNTY

APPENDIX XII: NACOSTI LETTER OF PERMISSION

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 191038

Date of Issue: 22/June/2021

RESEARCH LICENSE

This is to Certify that Miss., KHASEVI Gillian GILLIAN of Masinde Muliro University of Science and Technology, has been licensed to conduct research in Kakamega on the topic: FINE MOTOR PROFICIENCY AS A PREDICTOR OF WRITING OUTCOMES AMONG PRE-PRIMARY 1 LEARNERS IN KAKAMEGA COUNTY, KENYA for the period ending : 22/June/2022.

License No: NACOSTI/P/21/11367

191038

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

APPENDIX XIII: RESEARCH PERMIT AUTHORIZATION LETTER

REPUBLIC OF KENYA

MINISTRY OF EDUCATION

STATE DEPARTMENT OF EARLY LEA3RING AND BASIC EDUCA4TION

Telephone: 056-30411
Fax: 056 – 31307
E-mail: kcseducation2016@gmail.com
When replying please quote our Ref

County Director of Education
Kakamega County
P. O. BOX 137 - 50100
KAKAMEGA

REF: KAKA/C/GA/29/17/VOL.V/ 118

23rd June, 2021

Miss Khaseyi Gillian
Masinde Muliro University
Of Science & Technology
KAKAMEGA

RE: RESEARCH AUTHORIZATION

The above has been granted permission by National Council for Science & Technology vide letter Ref. NACOSTI/P/21/1367 dated 22nd June,2021 to carry out research on "**Fine Motor Proficiency as predictor or writing outcomes among Pre-primary 1 learners in Kakamega county**" for a period ending 22nd June, 2022

Please accord him any necessary assistance he may require.

FOR COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY

DICKSON O. OGONYA
COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY

CC
The Regional Director of Education
WESTERN REGION