Macrothink Institute™

Journal of Education and Training
ISSN 2330-9709
2022, Vol. 9, No. 2

Mainstreaming Physical Infrastructure in Early Childhood Education and its Influence on Participation Rates in Public Primary Schools in Embu County, Kenya

Anastasia Kamwitha Muthanje (Corresponding Author), Ibrahim Khatete, Andrew Riechi, Juliet Njeri Muasya

Email: anastasiakamwitha@gmail.com

Faculty of Education, University of Nairobi, P.O. Box 30197-00200 Nairobi, Kenya

Received: April 20, 2022 Accepted: May 23, 2022 Published: May 29, 2022

doi:10.5296/jet.v9i2.19910 URL: https://doi.org/10.5296/jet.v9i2.19910

Abstract

Early Childhood Education is crucial to the holistic growth of zero to eight years old children. This growth and development can to a large extent be realized through the provision and use of appropriate physical infrastructure. This study aimed to find out the status of Early Childhood physical infrastructure and how it influences participation rates, an aspect of internal efficiency in Public Primary Schools. Using stratified and simple random sampling techniques to get 39 public primary schools from 5 sub-districts; 39 primary headteachers, 156 primary teachers, and 39 ECE teachers. The study used a correlation design and collected data using questionnaires, a documentary analysis guide, and observation schedules. Data were analyzed using SPSS. Results were presented using percentages, frequencies, means, standard deviations, and inferential statistics of Pearson correlation. Results showed that there was a positive correlation between physical infrastructures such as kitchens, toilets for boys and girls, classrooms that are well ventilated, playgrounds, sports facilities, strong tall fences, furniture in good condition, and water points and internal efficiency ($r=0.653$, $n=37$, $p<.05$). The study concludes that there is a positive correlation between physical infrastructure and participation rates. There is a need for the county government in partnership with headteachers and parents to provide adequate physical infrastructure in Early Childhood Education.

Keywords: physical infrastructure, internal efficiency, participation rates, early childhood education, primary schools

1. Introduction

UNESCO (1995) noted that internal efficiency is the relationship between the inputs and the outputs in an educational system and results are immense from little inputs. According to Windham (1988), internal efficiency originates from engineering which denotes the technical process of obtaining desired outcomes with little input. Internal efficiency from Subedi's (2009) point is attaining a certain level of success in achieving a country's objective of a schedule as a gauge of concept countrywide checked by the input-output ratio. According to World Bank (1995), internal efficiency shows the progression of learners (input-output ratio) which emphasizes minimal dropouts and repeats to enhance efficiency. The low internal efficiency is shown by low promotion, participation, and graduation rates, particularly in primary schools (Lohani & Badshah, 1995).

Kothari (2004) noted that schools had low internal efficiency due to low participation rates. In Embu County primary schools, a large number of ECE children stagnate without any progression to class one which shows low participation rates. For instance, in the years 2018, 2019, 2020, and 2021 enrolments in class one was 1488, 1497, 1499, and 2952. This was expected to match with the enrolment of children while in ECE after completion of the ECE cycle which was not the case. In the years 2017, 2018, 2019, 2020, and 2021, the ECE enrolment was 5778, 6110, 7851, and 7813 respectively which was not the case in class one as shown in the data above. This denotes low participation rates in children as they transition into public primary schools which hinder mainstreaming of ECE strain and not realizing the expected outcomes.

Mainstreaming of Early Childhood Education entails incorporating Early Childhood Education (ECE) into primary schools in Kenya. Worldwide, ECE is important in the growth of kids from birth to eight years. Several global agendas have recognized ECE to be essential in education as well as in existence. For example; the Affirmation of Education for All 1990 article identifies that basic education commences before the primary level of schooling. This was a turning point in the comprehension of ECE for the reason that it put ECE into mainstream education. Subsequently, the significance of the Jomtien framework of ECE was amplified in the first objective of the Dakar Conference of 2000. The objectives emphasize mounting and refining ECE. The focus of this study is to implement ECE which is given priority in the policies and educational plans in Kenya, for instance, ECE being integrated into the primary cycle of education. The present study puts into consideration ECE which is integrated into public primary schools in Embu County, Kenya.

The UN Agreement on the Rights of Children 2001 Articles 28, 29, and 30 safeguard the privileges of a kid to obligatory and liberty to elementary schooling. This is of great importance to the current study for it practices ECE as a unit of elementary schooling. Another worldwide agreement that placed great attention on ECE was World Summit for Children (WSC) which took in Moscow in the year 2010. This agreement gave importance to the growth of ECE facilities such as the provision of schooling, healthcare, diet, and security of kids from birth to eight years old essential for initial internal efficiency in ECE education schools and subsequent schooling. Therefore, countries put their targets to realize

endorsements in conventions on ECE (UNESCO, 2010). The Millennium Development Goals (MDGs) 2010 agreed with goals to be apprehended by 2015. Among the five goals that focused on the schooling of the small kids; goal 2 is the most significant to this research because it was on the attainment of universal basic schooling, where ECE kids require attention in the initial stages which prepare them for future schooling.

Sustainable Development Goals (SDGs) succeeded MDGs in the year 2015 with accent high valued schooling (Goal 4), while further bearing in mind ECE as the base for sustainable development. Notably, goal 4 targets 4.2 declared that by the year 2030, nations must assure that all schoolgirls and boys need to gain high-valued early year's growth and child-care learning in readiness to transit to elementary schooling which could be amplified by the presence of adequate physical infrastructure.

According to Kapur (2019), physical infrastructure in the context of schooling refers to playgrounds, library facilities, laboratories, computer centers, technology, machinery, tools, and equipment. The present study considers physical infrastructure such as a kitchen, playground, sports facilities, strong tall fence, classes that are well aerated, furniture in good condition, water points, and toilets for boys and girls. Barret et al (2019) noted that rotation between different subject classes is affected across the world. This aims to increase participation in areas with the low provision of physical infrastructure such as classes and where classes are too small. Furthermore, in situations where classes are too small, the participation rates of children are enhanced by adopting flexibility in arranging furniture and other teaching equipment.

2. Review of Related Literature

An emerging composite of research recognizes that high involvement rates in high-quality ECE bring significant benefits to children. In their study in primary schools in the United Kingdom (U.K) on the impact of the construction of physical infrastructure such as classrooms on the learning progress of pupils aged 5 to 11 years and how it influences participation rates, Barrett, Davies, Zhang and Barrett et al (2017) used survey design with questionnaires to get data from 751 pupils who were stratified sampled in 34 varied classrooms in seven different schools. While the reviewed study used a survey design to get the data, the present study used a correlation research design to fill the literature gap. In addition, Barrett et al (2017) study used Pearson product correlation to analyze the data. The findings show that light and flexibility are essential factors in enhancing reading and writing mathematics since light is constructed by identifying a sufficient quantity of natural light, without glare. This study used 7 schools for the study. However, the researcher used 39 study schools which were chosen by use of stratified random sampling. The reviewed study informed the researcher on the importance of using questionnaires in getting data. While the reviewed study explored how light and flexibility enhances reading and writing mathematics, the researcher explored whether classes that are well-lit were adequate to fill the literature gap.

While Barret et al (2017) study investigated the impact of physical infrastructure design such as classrooms on pupils' learning progress, the present study sought to establish the presence

of well-ventilated classrooms latrines/toilets, classes that are well ventilated, water point sports facilities/playground, electricity, furniture, strong tall fence, playground and large compound for ECE in primary schools. Further, while Barrett et al (2017) study target population was pupils the current study targeted primary school headteachers, teachers, and ECE teachers. Additionally, while the reviewed study was done in the U.K, the present study was done in Embu County, Kenya to fill the gap. The reviewed study informed the researcher on the importance of using Pearson product-moment correlation in data analysis.

In Norway, Sando (2019) explored how the physical indoor environments in ECE influence children's well-being and physical activity. The study used a mixed-method construct consisting of qualitative and quantitative data. The data were obtained from video observations of the free play of 80 children in eight ECEC institutions. Multilevel regression analysis was used during data analysis and it indicated that children's well-being was positively associated with the use of rooms for physical activity and negatively associated with the use of high tables. Sando's (2019) study showed a positive relationship associated with children's well-being between physical environmental variables such as a classroom. The reviewed study used video observations of the free play of children as a research instrument. However, the researcher used direct observation of children's activities attached to the presence of physical infrastructures to fill the literature gap.

While Sando's (2019) study used children as the respondents, the present study used headteachers, primary teachers, and ECE teachers to get data thus filling the literature gap. Additionally, the reviewed study used a mixed-method design and analyzed data by use of multilevel regression analysis; therefore current study adopted a correlation research design and analyzed data using themes, and descriptive and inferential statistics to fill the gap. The reviewed study was conducted in Norway, a developed country and therefore could not be generalized to Kenya a third-world country that is less developed. The reviewed study informed the present study on the importance of considering the use of observations in getting data. This study was not focused on how physical infrastructure influenced internal efficiency in ECE schools and therefore the need for the present study.

Åström, Björck-Åkesson, Sjöman, and Granlund's (2022) study focused on the day to day environments and activities of children and teachers in Swedish preschools. Åström et al (2022) study used systematic observations of 3 to 5-year-old children and ECE teachers in 78 Swedish preschools of Montessori and Reggio Emilia preschools. The study findings demonstrated that free play indoors and outdoors dominates exercise settings. Verbal peer mingling is common as child-teacher verbal interactions and engagement vary amongst an indoor and outdoor free play. This study did not show which design was used whereas the current study adopted a correlation research design to assess the influence of mainstreaming ECE on internal efficiency in public primary schools in Embu County, Kenya. Correlation research design allowed collection of information by document analysis, administering of questionnaires, and observation schedule. Additionally, the reviewed study used children and preschool teachers as the main respondents; hence the current study used primary headteachers, primary teachers, and ECE teachers as the main source of information to fill the literature gap. Further, while the reviewed study was conducted in Montessori and Reggio

Emilia preschools, the present study was done in pre-primary schools attached to public primary schools to fill the literature gap.

Åström et al (2022) found that there was a high occurrence of indoor and outdoor free play activities which shows high internal efficiency in Sweedish preschools. Åström et al (2022) findings revealed that there was a small but significantly higher level of child engagement in indoor compared to outdoor free play. These findings found that indoor room for physical activities in preschools was viewed as more important for both children's well-being. However, the current study focused on activities such as a visit to the toilets, washing hands on a water point, use of wheels on the playground, writing and reading in well-lit classrooms, working with ease and comfort at tables and chairs, and protection due to presence of strong tall fence to fill the literature gap. The reviewed study was conducted in Sweden, a developed country, and could not be generalized to Kenya which is a less developed country. This study informed the present study on the importance of using ECE teachers as respondents. The reviewed study ignored the aspect of internal efficiency which the current study focused on to fill the literature gap.

Frimpong (2019) conducted a study to ascertain first-hand information about the state of the ECE centers' classroom environment in the Ga-West Municipality of Ghana. In carrying out this study, a convergent design mixed-methods approach was adopted, where both qualitative and quantitative data were collected. Simple and purposive random sampling was used to select 5 and 4 schools from 11 circuits. Data collection was done using a questionnaire, interview, and observation from 142 participants who comprised 4 ECE circuit coordinators, 130 ECE teachers, and 4 headteachers drawn from 20 schools within Ga-West Municipality in the Greater Accra Region of Ghana. This study had a limitation on how findings were analyzed since the authors did not show the data analysis approaches and the current study filled the gap by clearly stating that data were analyzed descriptively, inferential, and using the thematic method.

Frimpong's (2019) study findings showed that classrooms were not spacious enough for children's free movement. Many schools operated in poor environmental conditions that included classrooms that were not suitable for ECE since they had no decorations to attract children's attention. Frimpong's (2019) study informed the current study on the importance of using questionnaires and observation schedules in collecting data. Additionally, this study informed the current study on the importance of using ECE teachers and headteachers as respondents for the study. However, Frimpong's study did not inform this study on sample size and sampling procedures. Therefore, the current study filled the research gap by adopting stratified random sampling in selecting schools for the study and purposive sampling in selecting the respondents.

A study by Wokadala, Ogawa, Sharma, Kizito, Mugisha, Komunda, and Ssewanyana (2019) in Uganda sought to determine how school facilities impact access and learning achievements in the primary education sector. The researcher adopted a mixed-method design that involved both quantitative and qualitative techniques. Wokadala et al (2019) informed the current study on the use of a mixed-method approach involving both quantitative and qualitative

techniques. Wokadala et al (2019) used a sample of 301 needy schools from 20 districts across the country's 4 regions. The sampling technique used was stratified random sampling. However, the study's authors did not bring out the research instruments used to collect data as well as how they analyzed data. Therefore, the researcher used a questionnaire, document analysis guide, and observation schedule to collect data and analyzed quantitative data by use of inferential and descriptive statistics while qualitative data was analyzed thematically to fill the gap. Wokadala et al's study findings showed that the new infrastructure attracted enrolments of more children from their former schools. The reviewed study was conducted among 301 needy primary schools from 20 districts across 4 regions in Uganda. The current study was conducted among 39 ECE schools attached to public primary schools in five sub-counties of Embu County, Kenya with a sample of 39 primary headteachers, 39 ECE teachers, and 156 primary teachers and employed correlation research thereby adding knowledge to the existing literature. The reviewed study was conducted in Uganda while the present study was done in Kenya.

Kharemwa (2017) studied the influence of infrastructure development on early childhood education in Bondo sub-County, Kenya. The focus of the study was to establish the contributions of relevant stakeholders toward the development of ECE. Kharemwa used a descriptive survey design, Krejcie, and Morgan's (1970) formula to determine the sample size of 161 teachers and 85 headteachers. In collecting data Kharemwa used questionnaires and interview guides. Kharemwa study was conducted in Nyanza region while the current study was done in the Eastern region. Also, the study was on infrastructure development and not the efficiency of the school hence the current study is filling the research gap by focusing on physical infrastructure in ECE and its influence on internal efficiency.

Kharemwa further found that the financial allocation for infrastructure development by the ministry of education Siaya County Government and the management was inadequate (Mean=4.01, 5.53, and 4.00) respectively which indicates low participation rates in ECE centers. Kharemwa's study found that the county government has a positive attitude toward infrastructure development in Bondo (Mean=2.31) and concluded that there is an insignificant weak negative relationship between resource allocation on infrastructure development and the growth of ECE. This study did not focus on the internal efficiency aspect of participation rates as a dependent variable which the current study embarked on.

Kharemwa (2017) recommended parents and relevant stakeholders advocate for increased financial allocations for infrastructural development of ECE centers in Bondo sub-county since the current allocation is inadequate. Kharemwa's study informed the current study on the importance of infrastructural development for the enhancement of participation rates in ECE schools. Additionally, the reviewed study used a descriptive survey design and determined sample size by use of Krejcie and Morgan (1970). The researcher used a correlation research design and got information from primary headteachers, primary teachers, and ECE teachers who were simple randomly sampled and data got from them via questionnaires. In addition, the researcher got more data from the document analysis guide and observation schedule to fill the literature gap. This study informs the researcher on the importance of using headteachers and teachers as respondents for the study. Additionally, the

reviewed study informs the current study on the importance of using questionnaires in getting information from respondents.

Learning facilities influence the provision of quality education. Chepkonga (2017) conducted a study on the influence of learning facilities on the provision of quality education in early childhood development centers in West Pokot, Kenya. Chepkonga used a mixed-method research design with a questionnaire, observation checklist, and interview guide administered to stratified random sampled 37 headteachers, 205 teachers, and 4 education officers. Chepkonga's study revealed that the majority of public ECDE centers in West Pokot county had inadequate classes, desks, water, and kitchen stores among others which had a negative influence on the provision of quality education. While the reviewed study adopted a mixed-method research design there were no quantitative findings regarding the influence of learning facilities on the provision of quality education. At the same time, the study used a stratified sampling technique in selecting the respondents. Therefore, the researcher used a correlation research design and purposive sampling technique to select respondents to fill the gap in the literature. The reviewed study informs the researcher on the importance of using questionnaires and observation in collecting data. The reviewed study focused on how learning facilities influenced the provision of quality education and ignored how the facilities influenced internal efficiency which the researcher considered in this study. The reviewed study informed the researcher on the importance of using headteachers and teachers as respondents for the study.

Challenges facing the feeding programs in pre-primary schools in difficult circumstances by Oduya and Mwangi's (2019) study done in Kenya. Oduya and Mwangi's study aimed to investigate challenges experienced in feeding programs in pre-primary schools in difficult circumstances. They adopted a descriptive survey design and used questionnaires and an observation schedule to get data from purposively selected 20 headteachers, 40 teachers, 50 parents, and one Education Officer from purposively sampled 20 schools. Oduya and Mwangi's (2019) study revealed that the greatest challenge was the shortage of clean and safe drinking water. The study recommended that the government and stakeholders should develop possible measures to deal with finances and cost options. The reviewed study used a descriptive survey design. Therefore, the researcher used a correlation study to fill the literature gap. The reviewed study informs the present study on the importance of using headteachers and teachers among the respondents. The reviewed study used purposive sampling in selecting 20 schools for the study. Therefore, the researcher used stratified and random sampling to select 39 ECE schools for the study. While the reviewed study was done in Kenya, the current study was done in Embu county to fill the literature gap.

Descriptive survey research conducted in Kapcherop Division, Kenya by Jemutai (2018) aimed to investigate the influence of school facilities on pupils' transition from preschool to primary school via questionnaires, interview schedules, document analysis, and observation schedules to get information from purposively, stratified and simple random sampled ECDE teachers and headteachers in 43 public primary schools. Jemutai's (2018) study finding revealed that physical infrastructure was inadequate while the available ones were in a deplorable state which affected learning in children. Jemutai's study concluded that there was

a significant influence of learning facilities on the transition of children from pre-primary to primary schools in the Kacherop division. Therefore, Jemutai (2018) recommended that stakeholders, headteachers, Parent Teachers Association (PTA), parents, teachers, and education officers should unite to address the transition of children from pre-primary to primary schools. The reviewed study was conducted among ECDE teachers and headteachers and it used descriptive survey research. The present study was carried out in pre-primary schools and used a correlation research design. In addition, the reviewed study used stratified, purposive, and random sampling to select teachers and headteachers for the study. However, the study did not establish how many teachers and headteachers were used in the study. Therefore, the researcher used a correlational research design and simple random sampling to select 39 ECE teachers, 39 primary headteachers, and 156 primary teachers to fill the gap. The reviewed study informed the present study on the importance of using questionnaires, document analysis, and observation schedules in getting data.

Amollo (2018) carried out a study on the devolution of early childhood and education in Kenya: Improvement in infrastructural facilities' status and its influence on Enrolment in Siaya County. Quantitative data were sourced from 145 participants, including education officers, administrators, and teachers. In comparison, qualitative data were obtained from 12 participants, including senior education officers, non-governmental agencies, and primary school headteachers hosting ECDE centers. The study authors did not publish the details on how data were collected. However, from the study results, chi-square was used in data analysis to show the association between the extent of increase in ECDE enrolment and improvement in the status of classrooms. Further, the study authors did not show which statistical software was used in the data analysis. Therefore, the researcher used SPSS version 24 to help in the data analysis. The reviewed study solicited quantitative and qualitative data from different respondents who included education officers, administrators, and teachers as sources for quantitative data and qualitative data got from senior education officers, non-governmental agencies, and primary school teachers. However, the current study solicited information from the same respondents who included primary headteachers, primary teachers, and ECE teachers from public primary schools. The reviewed study informs the researcher on the importance of using different respondents in getting quantitative and qualitative data. Additionally, this study informs the researcher on the importance of using quantitative and qualitative data collection. Further, the reviewed study informed the researcher on the importance of using teachers and headteachers as respondents for the study.

Results show that the extent of increase in ECDE enrollment was significantly associated with improved classroom and furniture status. However, no significant association existed between the extent of increase in ECDE enrolment and improvement in the status of sanitation facilities, outdoor play equipment, and assistive facilities. Of the five infrastructural facilities, only classrooms, and furniture improved to the extent of causing a significant influence on enrolment. The results amplify the need for the County Government to broaden the scope of infrastructural facilities considered in the investment plan for public ECE centers to provide holistic development to children; thereby, building a strong foundation for lifelong educational attainment and socio-economic development. Amollo

(2018) informed the current study to research the Physical infrastructure in ECE and its influence on internal efficiency. From the reviewed literature, there was no direct and specific study focusing on physical infrastructure and internal efficiency. Hence, creating a research gap filled by the current study on physical infrastructure in ECE and its influence on internal efficiency.

Implementation of early childhood development education policy faces various challenges. Wangila (2017) aimed to scrutinize the challenges facing the implementation of early childhood development and education policy in Bungoma County, Kenya. Wangila used a mixed research design with questionnaires, Focus Group Discussion (FGD), observation schedule, and document analysis to solicit information from 9 Quality Assurance and Standard Officers (QUASOs), 27 headteachers, 81 ECE teachers, and 27 non-teaching staff from selected public primary schools. Wangila used descriptive statistics to analyze quantitative data and content analysis to analyze qualitative data. The present study sought to explore how teacher profession qualification in ECE influenced participation rates in children.

This study revealed that there was poor training for ECE teachers. In addition, Wangila's (2017) study revealed that teaching in ECE was aggravated by inadequate teaching and learning resources which included classrooms, desks, chairs, tables, playgrounds, swings, and slides, and the ones available were in bad condition which forced children to learn while seated on the floor due to lack of adequate desks. Further, Wangila (2017) found that teachers found it difficult to deliver in class because of the poor class environment with insufficient teaching and learning resources. While the reviewed study used a mixed research design, there were no quantitative findings regarding the challenges facing the implementation of early childhood development and education policy in such schools; however, the researcher adopted a correlational research design with questionnaires to get data from 39 ECE teachers, 39 public primary headteachers and 156 teachers who were purposively sampled. The observation schedule and document analysis guide were also utilized by the researcher for more information to fill the knowledge gap. Additionally, the researcher analyzed data using Statistical Package for Social Sciences (SPSS) whereby quantitative data was analyzed using descriptive and inferential statistics, and qualitative data were analyzed by use of themes thereby adding literature to the existing body of knowledge. The reviewed study did not focus on teacher professional qualifications in ECE and how they influence internal efficiency which the researcher focused on to fill the literature gap. This study informed the researcher on the importance of using questionnaires, observation schedules, and document analysis guides in getting data. Additionally, the reviewed study informs the present study on the importance of using headteachers and ECE teachers as respondents for the study. Further, this study informs the current study on the importance of using descriptive statistics in analyzing quantitative data and content analysis in analyzing qualitative data.

Ngirera (2018) carried out a study on center-related factors influencing the implementation of the curriculum in early childhood development programs in Turkana County, Kenya. Ngirera's (2018) study used a descriptive survey design and adopted observation and interview schedules to source data from 55 teachers who were purposively sampled in 55

ECD centers. Ngirera's (2018) findings showed that the teacher-pupil ratio was very high and harmed the implementation of the ECDE curriculum. Ngirera observed that nearly two-thirds of ECDE centers had no physical facilities. Ngirera's (2018) study concluded that a huge number of ECD centers had inadequate physical facilities such as classrooms and toilets. Ngirera's (2018) study recommended that the county government should construct more classrooms. The reviewed study was conducted in Turkana County which is an arid area and therefore may not be generalized in Embu due to social-economic factors which affect learning. Additionally, the reviewed study used a descriptive survey design and collected data via observation and interview schedules from teachers. Therefore, this study used a correlation study and collected data by use of observation schedule, document analysis, and questionnaire from headteachers, primary teachers, and ECE teachers to fill the literature gap. This study informs the researcher on the importance of using observation as an instrument for collecting data.

3. Research Methodology

The study used a correlational research design to assess how mainstreaming of early childhood education influences internal efficiency in public primary schools in Embu County, Kenya. To achieve the objective the null hypothesis there is no significant relationship between physical infrastructure in ECE and internal efficiency in public primary schools was used. The study targeted 381 public primary headteachers, 3951 primary teachers, and 483 ECE teachers in 381 public primary schools in Embu County, Kenya. The researcher used a purposive sampling technique to select 39 public primary headteachers and 156 primary teachers from 39 stratified sampled primary schools. In addition, a simple random sampling technique was used to sample 39 ECE teachers from 39 ECE schools attached to primary schools selected through stratified sampled techniques. The study used questionnaires for primary headteachers to get information on dependent variables of internal efficiency indicators of completion, transition, retention, and graduation rates. Also, primary headteachers' questionnaires aimed to get retention of children in ECE. Further, they intended to get the level of graduation rates in ECE classes. Primary headteachers' questionnaires were also used to get headteachers' demographic data, particularly regarding work experience, integration of ECE, and availability of physical infrastructures such as kitchens, toilets, and clean water for drinking and washing. The ECE teachers' questionnaires were useful in getting information on mainstreaming of early childhood education and its influence on internal efficiency in public primary schools in Embu County, Kenya. Questionnaires for ECE teachers sought information on the number of classes and toilets for boys and girls and enrolment of ECE schools. In addition, questionnaires for the ECE teachers sought data on the availability of drinking water for ECE and the availability of spacious classrooms. Primary teachers' questionnaires helped in getting data on mainstreaming of ECE and its influence on internal efficiency. Therefore, questionnaires for primary teachers sought information on the suitability and attractiveness of class one class for ECE children and the adequacy of teachers in handling transiting ECE children to class one. The researcher used document analysis to analyze documents such as the class register, and admission register. This was in view to get information on enrolment of ECE children and those in class one.

Also, document analysis helped in getting data on class sizes and behavior of children such as absenteeism. This is because absenteeism is a form of dropout in the early stages of learning in schools. The information from document analysis helped in the triangulation of data. In addition, the researcher used an observation schedule to check the availability of boys' and girls' toilets, classes that are well ventilated, water point, sports facilities, electricity, furniture in good condition, strong tall fence, playground, and large compound. The researcher also checked the activities attached to the presence of these observed physical infrastructures. This helped the researcher in making inferences on adequacy for participation rates of ECE children during learning. The inference was made depending on frequency on the Likert scale based on adequate, undecided, inadequate, and very adequate. The observation schedule gave the researcher extra information for further triangulation of data in addition to information got through questionnaires and document analysis.

The instruments were pre-tested on 5 pre-primary teachers, 5 and 20 public primary headteachers, and teachers respectively. These were about 13% of the targeted sample of public primary headteachers and teachers respectively. Pre-testing was repeated after a week on the same group of public primary headteachers and teachers. The results from the two pilot studies yielded a 0.78 correlation coefficient of reliability using the Pearson Product moment correlation coefficient. The instruments yielded 0.89 by use of the Cronbach Alpha model which implies that the instruments were highly reliable to be used in the main study. This is as observed by Orodho (2009) who argued that a correlation coefficient of 0.7 was adequate to judge the reliability of the research tools. In addition, one content analysis and one observation schedule were checked for reliability. These yielded a 0.78 correlation coefficient by use of the Spearman-Brown formula which implied that the two instruments were reliable to measure what they purported to measure.

By the way, the quantitative analysis included data classification, categorization, and analysis following the study objectives. Qualitative data were analyzed by adopting a process of data editing, coding, classification, and identifying key themes and sub-themes. Content analysis analyzed information got from open-ended questions, observation schedules, and document analysis data. Hence, themes were identified and codes assigned to them, and classification of themes respectively. Quantitative and qualitative analysis was performed using Statistical Package for the Social Sciences (SPSS).

Lastly, the research was conducted within the framework of research ethics, in which case, potential public primary headteachers, primary teachers, and ECE teachers have consented, given the opportunity for voluntary participation, and withdrawal of consent before or during information gathering. The headteachers, teachers, and ECE teachers have also assured confidentiality of their responses. In addition, ethical clearance was obtained from the University of Nairobi Ethics and Research Committee, while a research permit was got from the National Commission for Science, Technology, and Innovation (NACOSTI).

Presentation aand Discussion of Research Findings on Physical Infrastructure and Participation Rates in Public Primary Schools

There were three types of questionnaires mainly for the public primary school headteachers

and teachers, and pre-primary school teachers. The questionnaire return rate is as shown in Table 1

Table 1. Questionnaire return rate

	Category	Frequency	Out of	Percentages
Response	Pre-primary	36	39	92.3
	Primary teachers	145	156	92.9
	Headteachers	37	39	94.8
Total		**218**	**234**	**100**

As shown in Table 1 all the 39 public primary headteachers', 39 pre-primary teachers', and 156 public primary teachers' questionnaires were administered. However, the questionnaire return rate was 36(92.3%) for pre-primary schools out of 39, 145(92.9%) for public primary teachers out of 156, and 37(94.8%) for public primary headteachers out of 39. Data presented in this section is based on responses from public primary headteachers and teachers, and pre-primary teachers on the status of various physical infrastructures. Physical infrastructures included classes, a kitchen, water for drinking and washing, a toilet for boys and girls, sports facilities, electricity, furniture, and a strong tall fence which were considered in the present study. This was because of how these physical infrastructures influence internal efficiency, particularly the aspect of participation rates in pre-primary schools.

The researcher sought to find out from primary teachers about the adequacy of classes in pre-primary and how it enhances participation rates in children. The study results are presented in Table 2

Table 2. Primary teachers' response on the adequacy of classes in pre-primary to enhance participation rates in children

	Frequency	Percentage
Strongly agree	73	50
Agree	56	38.9
Undecided	8	5.6
Disagree	4	2.8
Strongly disagree	4	2.8
Total	145	100

Results in Table 2 show that of the 145 primary teachers 73(50%) indicated that classes were adequate, 56(38.9%) agreed that classes were adequate, 8 (5.6%) felt that they were undecided about what to indicate, 4(2.8%) disagreed that classes were adequate to enhance participation rates in pre-primary children while 4(2.8%) indicated that they strongly disagreed that classes were adequate hence enhanced participation rates in pre-primary children. School planners have always struggled to come up with an appropriate environment such as adequate classes that can facilitate the education process to enhance participation rates in children (Barret et al, 2019). As witnessed by many that the greatest challenge posed to pre-primary children is to provide them with a good beginning academically (World Bank, 2008). This can only be so if there are adequate classrooms to accommodate children in pre-primary schools. Although this

study reveals that 73(50%) of the respondents indicated classes are adequate for pre-primary children. This implies that though a good number of respondents indicated that there are adequate classes, there is still a challenge in accommodating the required number of children in pre-primary schools. This is because the number which is recommended by the Early Childhood Education Policy Guideline of 2018 and 2006 is 25 children per class. This is not possible since, in many pre-primary schools, pre-primary 1 and 2 are mostly combined as revealed in this study, especially in public primary schools which results in overwhelmed class capacity in pre-primary schools. This is in agreement with a study conducted in Ghana by Frimpong (2019) which established that there was overcrowding in pre-primary schools due to a low level of provision of physical infrastructure. Additionally, Ngirera's (2018) study findings are in agreement with the present study since it revealed that two-thirds of pre-primary children lacked physical facilities which resulted in low participation rates in pre-primary children in Kenya.

The study sourced information on the adequacy of various physical infrastructures such as latrines/toilets, classes that are well ventilated, water point, sports facilities, electricity, furniture, and a strong tall fence to enhance participation rates in pre-primary schools' children. The results are presented in Table 3.

Table 3. Level of adequacy and inadequacy of physical infrastructure to enhance participation rates in pre-primary schools' children

Infrastructure	Adequate		Inadequate	
	F	%	F	%
Latrines/Toilets	29	80.5	7	19.4
Classes that are well ventilated	28	77.8	8	22.2
Waterpoint	25	69.4	11	30.6
Sports facilities	19	52.8	17	47.2
Electricity	12	33.3	24	66.7
Furniture	20	55.6	16	44.4
Strong tall fence	19	52.7	17	47.2

The results presented in Table 3 show that of 145 participants, 29(80.5%) felt that latrines/toilets in study schools were adequate while 7(19.4%) of them felt they were inadequate, and participants who felt that classes that are well ventilated were 28(77.8%) while 8(22%) of them indicated that classes were inadequate. Those who felt that the water point was adequate were 25(69.4%) while those who disagreed were 11(30.6%). Participants who felt that sports facilities were adequate were 19(52.8%) while those who viewed them as inadequate were 17(47.2%). 12(33.3%) of the respondents indicated that electricity was adequate while 24(66.7%) felt it was inadequate. 20(55.6%) of the participants indicated that furniture in schools was adequate, while those who viewed it as inadequate were 16(44.4%). Finally, respondents who felt that a strong tall fence was adequate in schools were 19(52.7%) while those who felt it was inadequate were 17(47.2%).

However, data from the observation schedule of pre-primary physical infrastructure, indicated that the majority of 10(28%) classrooms were adequately well-lit to enable children to write

comfortably; the majority of 29(80.5%) toilets were adequate for the use by the children; majority 20(55.6%) of water points were adequate to enhance hand wash by the children; majority 10(28%) of the playground was adequate to enhance the use of wheels by the children; majority 12(33.3%) of furniture such as tables and chairs were adequate to enable children to work with ease; majority 25(69.4%) of the strong tall fence was adequate to give protection of children while being in the school compound and majority 26(72.2%) of the compound was adequate to enable children to move with ease. Notably, the study finding showed that 29(80.5%) of participants indicated that latrines/toilets were adequate; 28(77.8%) of them indicated that classes were well aerated; 25(69.4%) felt that water point is adequate; sports facilities were adequate as indicated by 19(52.8%) of them. However, only 10(28%) of the participants indicated that classrooms were adequately lit which implies that the majority had basic physical infrastructure. However, the majority of schools had no electricity connection which may have impacted negatively participation rates in pre-primary children. The adequacy of physical infrastructure was further confirmed by the researcher's observation using the observation schedule checklist which confirmed that 28(80.5%), 20(55.6%), 25(69.4%) and 26(72.2%) toilets, water, strong tall fence, and compound were respectively adequate. However, the study revealed that 10(28%) and 12(33.3%) of playgrounds and furniture such as tables and chairs were inadequate. This implies that some of the physical infrastructures were well provided in pre-primary schools while some were not. This study conforms with a study conducted by Wangila (2017) who found that there were inadequate desks, chairs, tables, and playgrounds in primary schools in Kenya which impacted negatively learners' participation rates. Additionally, this study's findings agree with a study in Uganda by Wokadala, Ogawa, Sharma, Kizito, Mugisha, Komunda, and Ssewanyana (2019) whose study findings showed that conducting classes in shifts due to inadequate facilities such as classes inconvenienced children’s recreation and learning schedules which contribute to low participation in primary children.

The researcher sought to find out from headteachers' availability of kitchens in schools and how it enhances participation rates in children. The findings are presented in Table 4

Table 4. Availability of kitchens in schools and participation rates in children

	Frequency	**Percentage**
No	7	8.9
Yes	30	81.1
Total	37	100

Concerning the availability of kitchens in primary schools in respect to how it enhances participation rates in pre-primary children, as in Table 4 data from primary headteachers showed out of 37 of them who participated in the study, 30(81.1%) of them indicated that kitchen was available and the rest 7 (8.9%) designated that primary schools have no kitchen. Concerning the availability of the kitchen and how it enhances participation rates in pre-primary children, the study findings revealed that 30(81.1%) of the respondents indicated that the kitchen was available. This implies that in most of the primary schools studied, there was a kitchen that was used by both the pre-primary and primary sections which to some extent

enhanced participation rates in pre-primary children since they were able to be served food on time which make them continue learning since could get satisfied while at school. This study finding is in disagreement with a study conducted in Kenya by Chepkonga (2017) which revealed that the majority of primary schools had inadequate kitchens and the available ones were in deplorable condition.

The researcher sought to find out from headteachers the number of available toilets for boys and girls and how it enhances participation rates in children. Results are as shown in Table 5

Table 5. Number of available toilets for boys and girls and participation rates of children

	Number of Toilets
Boys	30
Girls	33

Regarding the number of available toilets for boys and girls with respect to enhancing participation rates in pre-primary children, results in table 4 show that number of toilets for boys was 30 while for girls was 33 in number. Concerning toilets for both boys and girls regarding their contribution to participation rates in pre-primary children, respondents revealed that there were 30 and 33 toilets for boys and girls respectively. This shows that out of 39 schools that were used for study, some schools did not have toilets for both boys and girls which meant that in some schools children shared the available toilet which in some way could lower participation rates in pre-primary children due to time wastage while sharing. This is in agreement with the findings of a study in Kenya by Ngirera (2018) who found that two-thirds of ECDE centers had inadequate physical facilities such as toilets and recommended county governments construct more to enhance the participation rates of children.

The researcher sought to find out from the headteachers the availability of water for drinking and washing of hands and how it enhances participation rates in children in pre-primary schools. These findings are presented in Table 6

Table 6. Availability of water for drinking and washing of hands in the pre-primary school section and participation rates in children

	Frequency	**Percentage**
Yes	29	78.4
No	8	21.6
Total	37	100

Concerning the availability of water for drinking and washing hands in children of pre-primary schools to establish whether hygiene was observed in pre-primary schools which could affect participation rates of pre-primary children, results showed that out of 37 respondents, 29(78.4%) indicated that water was available while the rest 8(21.6%) revealed that there was

no water in pre-primary schools. Additionally, data from pre-primary teachers exposed that the majority of 20(55.6%) indicated that clean tap water for drinking and washing is available in pre-primary schools. With reference to the availability of water for drinking and washing hands to establish whether it enhanced hygiene in pre-primary children henceforth enhancing participation rates in children, data revealed that 29(78.4%) of the respondents indicated that water was available. Additionally, information from pre-primary teachers exposed that the majority of 20(55.6%) indicated that clean taped water for drinking and washing hands was available. This implies that children rarely fell sick due to poor hygiene hence this clean condition enhanced participation rates in pre-primary children. These findings are in disagreement with the Kenyan study by Oduya and Mwangi (2019) who found that physical infrastructures such as drinking water were inadequate and recommended government and stakeholders develop possible measures to deal with finances and cost options.

To establish whether there is an association between the provision of physical infrastructures and internal efficiency, a Pearson product-moment correlation was done. The results are as shown in Table 7

Table 7. Pearson product-moment correlation results for physical infrastructure facilities and internal efficiency

		Internal Efficiency	**Physical Infrastructure**
Internal Efficiency	Pearson Correlation	1	. 653*
	Sig. (2-tailed)		.018
	N	37	37
Physical facilities	Pearson Correlation	. 653*	1
	Sig. (2-tailed)	.018	
	N	37	37

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

In relation to Table 7, the results indicate that there is a positive correlation between the provision of physical infrastructure in ECE and internal efficiency in public primary schools (r = .653, n = 37, p<.05). Concerning Pearson Product-moment correlation results for physical infrastructure facilities and internal efficiency as indicated in table 1, results revealed that there is a positive correlation between the provision of physical infrastructure in ECE and internal efficiency in public primary schools. This proposes that the provision of physical facilities contributes to the internal efficiency aspect of participation rates by 65.3%. This implies that the more the physical facilities are provided, the more the internal efficiency aspect of participation rates, and the less the provision of physical facilities in pre-primary schools, the lower the internal efficiency aspect of participation rates.

6. Conclusion

The study focused on determining the provision of physical infrastructure in ECE and its

influence on internal efficiency. Its purpose was to determine the status of physical infrastructure and its influence on internal efficiency in public primary schools in Embu County, Kenya. Of the ten physical infrastructures considered in this study, most of them were adequately provided while others such as electricity, well-lit classrooms, and playground were inadequately provided hence impacted negatively children's participation rates. The results collaborate with most literature reviews that showed that there was considerably inadequate physical infrastructure such as well-lit classes, playgrounds, tables, and chairs which harmed participation rates of children in pre-primary schools. Regard to inferential statistics (Pearson Product moment correlation) shows that physical infrastructure in ECE and the internal efficiency aspect of participation rates have a significant positive correlation. This implies that as physical infrastructure provision increases, participation rates increase in primary schools and as physical infrastructure decreases in primary schools, participation rates in children also decrease.

7. Recommendations

The study recommends improvement in the provision of physical infrastructures such as electricity, well-lit classrooms, playground, tables, and chairs to enhance participation rates in ECE children in public primary schools.

References

Amollo, O. P. (2018). Devolution of Early Childhood Development and Education in Kenya: Improvement in the Status of Infrastructural Facilities and Its Influence on Enrolment in Siaya County. *Journal of Education and Training*, *5*(2), 221-245. https://doi.org/10.5296/jet.v5i2.13614

Barrett, P., Davies, F., Zhang, Y., & Barrett, L. (2017). The Holistic Impact Of Classroom Spaces On Learning In Specific Subjects. *Environment And Behavior*, *49*(4), 425-451. https://doi.org/10.1177/0013916516648735

Barrett, P., Treves, A., Shmis, T., Ambasz, D., & Ustinova, M. (2019). *The Impact of School Infrastructure on Learning: A Synthesis of the Evidence. International Development in Focus;* Washington, DC:https://open knowledge. worldbank.org/handle/10986/30920 License: CC BY 3.0 IGO. https://doi.org/10.1596/978-1-4648-1378-8

Chepkonga, M. C. (2017). Influence of Learning Facilities on Provision of Quality Education in Early Childhood Development Centres in Kenya. *International Journal of Education and Research*, *5*(6).

Douglas, M. (1988). *Document resume ed 351 784 ea 024 475. Lmi*.

Frida, Å., Eva, B. Å., Madeleine, S., & Mats, G.. (2022). Everyday environments and activities of children and teachers in Swedish preschools. *Early Child Development and Care*, *192*(2), 187-202. https://doi.org/10.1080/03004430.2020.1754209

Frimpong, S. O. (2019). The Classroom P Physical Environment As A " Third Teacher " For An Early Childhood Education Provision In The Ga-West Municipality Of Ghana. *PEOPLE:*

International Journal of Social Sciences, 4(3), 1339-1360. https://doi.org/10.20319/pijss.2019.43.13391360

Jemutai, S. (2018). Influence of school facilities on pupils' transition from preschool to primary schools in Kapcherop Division, Kenya. *European Journal of Education Studies, 4*(4). https://doi.org/10.5281/zenodo.1213598.

Kapur, R. (2019). Infrastructure development in schools https://www.researchgate.net/publication/334029594_Infrastructure_Development_in_Schools#fullTextFileContent

Kharemwa, L. N. (2017). *Influence of Infrastructure Development on Growth of Early Childhood Development Centres in Bondo Sub-County, Kenya* (MEd Thesis, University of Nairobi.

Kothari, C. R. (2004). Research methodology: Methods and techniques. New Delhi: New Age International Publishers.

Republic of Kenya. (2010). *The Constitution of Kenya.* Nairobi: Government Press.

Lohani, P. C & Badshah, V. H. (1995). Common Fixed Point and Weak, https://www.researchgate.net/publication/268174532_Common_fixed_point_and_weak_commuting_mappings

Ministry of Education [MOE]. (2017). *Education for Sustainable Development Policy for the Education Sector,* UNION Publishing Services Section

Ngirera, L. P. (2018). *Center related factors influencing implementation of the curriculum in early childhood development programs in Turkana County, Kenya* (M.Ed Thesis, Kenyatta University) *Retrieved from https://ir-library.ku.ac.ke › bitstream › handle › C...*

Oduya, A., & Mwangi, M. (2019). Challenges facing the feeding programmes in pre-primary schools in difficult circumstances in Kenya. *European Journal of Education Studies*, *6*(8), 2019.

Orodho, J. A. (2009). Elements of education and social science research methods. Nairobi/*Maseno*, *2*(6), 26-133.

Project, E., Right, T. H. E., Educationkenya, T. O., Analysis, B., Constitution, T., Act, B. E., …& Act, B. E. (2014). *Right To Education Country Factsheet*. *March*, 1-29.

Sando, J. (2019). The physical indoor environment in ECEC setting: Children's well-being and physical activity. *European Early Childhood Education Research Journal, 27*(4), https://doi.org/10.1080/1350293X.2019.1634238

Subedi, R. P. (2009). *Internal Efficiency of Primary School in Nepal:* A Unpublished

UNESCO. (1990). *World Declaration on Education for All and Framework for Action to Meet Basic Learning Needs.* UNESCO.

UNESCO. (1995). *Review of the Present Situation in Special Needs Education*. Paris:

UNESCO.

UNESCO. (2000). World Education Forum (Dakar, Senegal 26-28 April 2000) – Final Report. Paris: UNESCO.

UNESCO. (2010). EFA Global Monitoring Report 2010: Reaching the marginalized, UNESCO, Paris. http://www.unesco.org/new/en/educa-tion/themes/leading-the-international-agenda/efareport/reports/2010-marginalization/

UNESCO. (2010). *Moscow Framework for Action and Cooperation: Harnessing the Wealth of the Nations*. UNESCO, Paris.

United Nations (UN). (2010). *United Nations (UN) Summit on the Millennium Development Goals.* Unite Nations.

United Nations (UN). (2015). *Transforming World: The 2030 Agenda for Sustainable Development*. United Nations.

Wangila, V. M. (2017). The Challenges Facing the Implementation of Early Childhood Development and Education Policy in Bungoma County, Kenya. *Journal of Education and Practice, 8*(15), 217-223.

Wokadala, J., Ogawa, K., Sharma, U., Kizito, O., Mugisha, X., & Ssewanyana, S. (2019). Impact of the school facilities grants on access and learning achievements in the primary education sector in Uganda. *Grantee Final Report, April 2019*

World Bank. (1995). *Priorities and Strategies for Education.* A World Bank Review: Washington D.C: World Bank.https://doi.org/10.1596/0-8213-3311-9