GREAT JOURNS

Journal of Education

Vol.1 No.2, July 2025

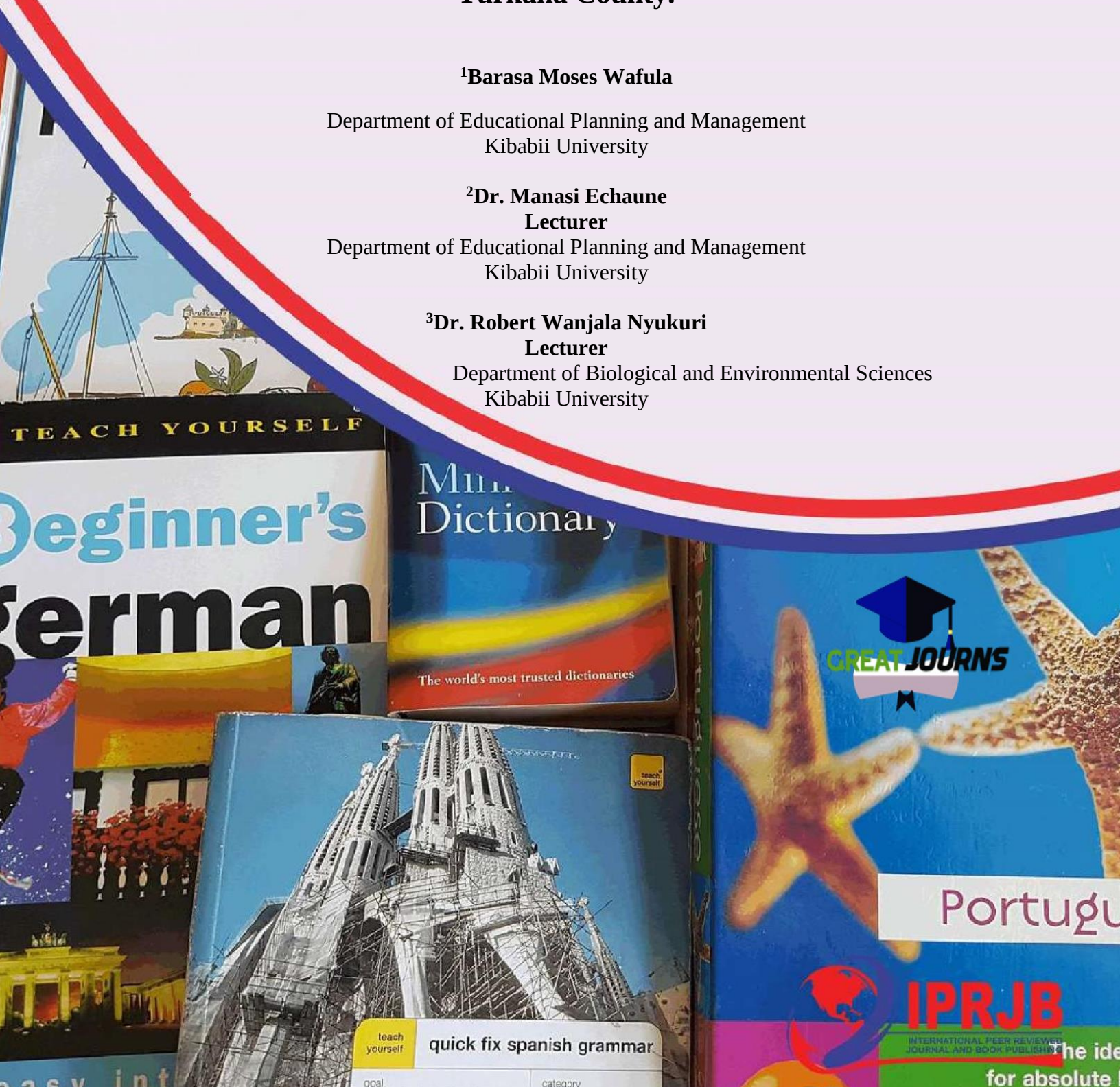
The Relationship Between Management of Physical infrastructure and the Learning Outcome of the Competency Based Education in Junior Schools, Turkana County.

[1]Barasa Moses Wafula

Department of Educational Planning and Management
Kibabii University

[2]Dr. Manasi Echaune
Lecturer
Department of Educational Planning and Management
Kibabii University

[3]Dr. Robert Wanjala Nyukuri
Lecturer
Department of Biological and Environmental Sciences
Kibabii University



Great Journs
ISSN: 2328-4870
Vol.1 No.2, July, 2025

Journal homepage: www.greatjourns.com

ABSTRACT

Education is a critical driver of human capital development, social transformation, and economic growth. In recent years, Kenya has embarked on a significant shift in its education system from the long-standing 8-4-4 model to the Competency-Based Education (CBE) framework. The CBE approach prioritizes the acquisition of practical skills, knowledge, and values that enable learners to demonstrate competence in real-life contexts rather than merely recalling theoretical content. At the junior school level covering learners in Grades 7 to 9 CBE emphasizes learner-centered pedagogies, integration of cross-cutting issues, and the development of competencies in literacy, numeracy, digital literacy, creativity, communication, and problem-solving.This research investigated the Relationship Between Management of Physical infrastructure and the Learning Outcome of the Competency Based Education in Junior Schools, Turkana County. The research employed mixed methodology, combining qualitative and quantitative data collection approaches. From a target population of 3,461 participants which included 11 education officers, 335 junior secondary students, and 23 headteachers where proportionate stratified random sampling technique yielded 359 respondents. Data collection involved interview schedules, observation guide, structured questionnaires for primary data, while secondary data came from document analysis of school records and county education office files. Analysis utilized SPSS Version 25, applying both descriptive statistics (means, frequencies, percentages) and inferential methods (correlation and regression analysis). The findings addressed essential questions on the key objectives showing varying levels of significance where management interventions ($\beta = 0.342$, $p < 0.001$).The research conclusively show that educational management dimensions complement each other in order to influence CBE learning outcomes in junior schools in Turkana County. Therefore, no single dimension operates in isolation; rather, the combined effect of infrastructure management, teacher management, materials availability, and management interventions produce optimal educational results. This conclusion validates the theoretical framework of educational institutions as complex systems requiring comprehensive management approaches.The Kenya Ministry of Education should develop and enforce minimum standards for educational management across all dimensions studied. These standards should specify threshold levels for infrastructure adequacy, teacher qualifications, materials availability, and management intervention capacity. Priority should be given to helping schools achieve these minimum thresholds rather than distributing resources uniformly across all institutions.

Key Words: ***Management of Physical infrastructure, Learning Outcome, Competency Based Education***

1.0 INTRODUCTION

Management of teaching and learning resources is key in realizing the learning outcome of an education system. The introduction of the new education system aims at addressing the gaps seen in the defunct 8-4-4 system of education and brings in desired changes that aligns to the educational needs of Kenyan skills and job market. Morris, Wawire, Muchira, & Oh, (2023) affirms that the USA and South Korea are ideal models for implementation of a comptetence based curriculum. In this research, the USA successfully implemented CBE and therefore provides ground to benchmark with countries like Kenya who are at the initial stages of implementing the CBE curriculum, especially on the area of management of reseources that serve the aims and objectives of the CBE system. In the USA, CBE was introduced to deal with the low student achievement rates and poor quality of teacher training. The implementation of CBE was to bring about learning that encouraged teachers to express their teaching objectives in terms of observable student behaviors and improve on competencies needed to address key societal needs. Hence, the focus of CBE in America at first was on teacher training to understand and grasp the teaching pedagogy and approaches that are effective to the practical learning outcomes. The key steps to implement the education program according to lessons in USA and South Korea were focused on the needs assessment at all levels of education. This ensured proper planning and management of the education system proposed so that resources necessary were in place to achieve the learning outcomes.

Further, Cheptoo (2019) looked at Indonesian education system which shifted the teacher's role from being the center to a facilitator of learning to encourage learners set goals, develop critical thinking for lifelong training. As an

aspect of educational management, teacher's role faces a paradigm shift from teacher-centered approach to learner-centered approach in CBE in Kenya. Hence, the need to assess how the management aspects of the role of a teacher through capacity building in employing necessary teaching methods of CBE as it is introduced and rolled out across Kenya. Subsequently, attention to different management dimensions will help achieve the learning outcomes by learners through the guidance of teachers. The CBE sytem is encouraging movement away from teachers telling learners what to do and learners are perceive receivers of the process to learners actively getting involved from what they know and guided to appreciate what they do not know.

11: LITERATURE REVIEW

2.1 Management of Physical Infrastructure and the Learning Outcomes

School infrastructure refers to classrooms, playing fields, laboratories, library, swimming pool, libraries, kitchen/dining hall, desks, toilets and other basic infrastructure that facilitate an environment of learning as described by Mwikali, (2024). Management of these key infrastructure ensures learner concentration, practical skills development and focus, thus improving learning outcomes.

In a paper by Navarro, (2022) published by Philippines Institute for Development Studies with the title, 'School Infrastructure in the Philippines: Where we are and where we should be heading?' sought to assess the current status of the school infrastructure in the Philippines basic education sector and wanted to identify and explain the gaps and formulate policy recommendations to explain the status. The study employed a qualitative research and document review and key informant interviews as specific qualitative research techniques. The study limited itself to basic education sector to provide data to the policy makers to correct the lapses in the sector. The key findings indicated that compared to other countries in South and North Asia such as Indonesia, Cambodia, Mongolia, Republic of Korea, China among others, Phillipnes had decongested classrooms but spartial inequality in classroom-student ratio exists, a gap to be addressed. With respect to sanitation facilities in basic education sector, the Philippines lags behind other nations in the same region of Asia. The Philippines also has challenges in provision of electricity in schools as well as provision of internet to enable technological studies. Thus, there was need to invest in the school sector more because of the challenges schools face. In this research, the comparative view of how infrastructure is handled was necessary in identifying the management requirements of CBE resources within Turkana County as compared to other regions in Kenya in terms of infrastructure and how this affects the learning outcomes in junior schools, thus the gap in this literature was majorly on the context-based. Whereas the study was carried out in the Philipines, the Kenyan context was not a factor which the current study managed to utilize in understanding the management dimensions of CBE sytem and the learning outcome.

In Ethiopia, there is a quest to improve the quality of education through infrastructure provision as presented by in a research by Goshu & Woldeamanuel, (2019) with the title, 'Education Quality Challenges in Ethiopian Secondary Schools', used a descriptive survey method with questionnaires. A random and purposive sampling technique was used to select 72 directors, 50 vice directors, 71 supervisors, 52 unit leaders and 638 teachers from two secondary schools. Descriptive data analysis technique was used for data analysis. From the findings presented, quality education is largely related to the preparedness of teachers but above all the management of resources by administrators play a key role in ensuring quality education. Goshu & Woldeamanuel, (2019) however, presents a conflicting information in the conclusion. Whereas the title is to assess challenges associeted with the quality of education, the conclusion of the study was looking at the perception of secondary school teachers, education administrators on the challenges and opportunities of quality of education. Further, the methods of sampling presented were not exhaustively presented in the research thus making it difficult to make credible assessment of the research as the sample size of the target population in not specified unlike the one we have in this study specified before carrying out the research. Hence, the current study sought to fill this gap.

Ngeno, Mweru, & Mwoma,(2021) carried out a study to establish the relationship between the availability of physical infrastructure and implementation of the competency-based curriculum in public primary schools. Using a descriptive survey design and correlation research design, the study population target included 24 County Support Officers (CSOs), 524 head teachers, and 610 grade one selected schools. A sample size of 6 CSOs, 52 headteachers and 610 selected grade one schools. The findings established physical infrastructure had a moderate positive influence on CBE implementation with a correlation of 0.336 and a calculated value of 0.029 for headteachers and 0.285 with a calculated value of 0.03 for grade one teachers. Thus, the study concludes that physical infrastructure

and implementation of the CBE are moderately related and that other factors such as provision of laboratories, music room, creative arts, and expansion of libraries, ICT rooms and more space in the field to allow physical activities are necessary in realizing the learning outcomes of the CBE in primary grade level. However, the current study went beyond establishing mere provision of infrastructure and addressed the critical role of managing the infrastructure in order to enable learners achieve the learning outcomes of the CBE system. This was so because the current literature failed to link the relationship between the infrastructure and the learning outcome. Also, it does not give any indication of junior school rather concentrates on primary schools under the 8-4-4 system of education unlike the research which undertook to assess the context of junior schools and the application of the managemement strategies aimed at teaching and learning resource management for junior schools and the learning outcomes.

Majority of the research work presented dwell on qualitative data with detailed description of the phenomena. Whereas this is acceptable, a further interwoven methodology provided a balanced and credible mixed method by the current study. This did not only add to the body of knowledge but also critique the status quo to provide alternative quality of the data presented, analysed, discussed and policy recommendations to assist the CBE in junior school align to the new trends of Education in 2025 and beyond.

III: RESEARCH METHODOLOGY

3.1 Study Locale

This research was carried out in Turkana County. Turkana County is a vast area measuring 77,000 square kilometres. The area borders three countries namely Sudan on the north, Ethiopia on the East and Uganda on the west. In the south, it borders Baringo and West Pokot counties. It is a semi-arid land with majority of residents being pastoralists. The climatic conditions are characterised by high temperatures. The population spread is spatial with market centres and towns recording density in population. Most people walk long distances to access social amenities such as schools, hospitals and essential services such banking. The national electricity distribution grid is limited to towns and major market centres and mostly solar-powered with limited diesel run engines. The distribution of schools electricity to enable ICT infrastructure therefore is limited. (Appendices 2: Turkana County map)

3.2 Research Design

This study adopted mixed methods design. Dovetail Editorial Team, (2023) states that a mixed method is a blend of qualitative and quantitative data that allows for more thorough investigation of complex research questions that can neither be answered by quantitative nor qualitative alone. According to George, (2021) mixed method has elements of qualitative and quantitative approaches to provide for an in-depth collection, presentation, analysis, interpretation and discussion of the trends and relationships of the variables. The mixed method therefore, provided a triangulation which is necessary in eliminating data biases that occurred during the research analysis when only one method is used to collect data. Further, quantitative data is understood better when a detailed description of the numerical was presented on the complex nature of the issues surrounding the CBE system of education in Kenya. Further, this method was necessary in the research to put findings into context and add a detailed approach to the findings in order to justify the approaches and authenticating the research findings by eliminating the data biases.

3.3 Target Population

The study targeted a population size of 3,461 people as shown in table 3.1. This comprised of 11 education officers from the Ministry of Education drawn from 11 sub-counties of Turkana County, 225 headteachers of junior schools, and 3,225 learners of junior schools in Turkana County. 3,225 was the total number of learners enrolled in junior schools in 225 schools across Turkana County as of February 2025.

Headteachers were a necessary inclusion in this study since they are the managers charged with the responsibility of planning, coordinating, and ensuring utilization of school resources and monitoring the implementation of educational activities in the institution on behalf of the Ministry of Education. Also, as teachers, headteachers are teachers that interact with the day-to-day teaching and learning resources and so their input in the preparedness of other teachers was important in knowing the role of the teaching staff in ensuring the achievement of the learning outcomes. On the other hand, Education Officers from the Ministry of Education are responsible for providing facilitation, approvals and guidance of the school managers in ensuring that resources that affect the learning

Great Journs
ISSN: 2328-4870
Vol.1 No.2, July, 2025

outcomes are provided and utilised effectively. The junior school learners were purposively included in this study to help in assessing the learning outcome of the management of teaching and learning resources in view of the learning outcomes in junior schools.

Table 3.1 Target population of study

Category of the population	Population size
Education officers	11
Head-teachers	225
Learners	3,225
Total population	3,461

Source: Turkana County Education Office (2023)

3.4 Sampling Technique

This research used probability sampling technique in arriving at the sample size that helped to get representative of each specific group of the population. Makwama, Engineer, Dhabi, & Chudasama, (2023) states that a probability sampling technique is where every member of the population has a predetermined chance of being selected to be included in the sample. Hence, every member of the population in the education sector had a potential respondent for the current research.

This research used a number of probability sampling techniques based on specific population presented which include headteachers as managers, education officers from the ministry of education and learners from the 225 junior schools and also the observation guide in 23 schools. The techniques for each category of the population are as presented in table 3.2

3.5 Sample Size

In order for the sample size to be manageable, the researcher utilized the following formulae to establish the study sample size. This size enabled the researcher to obtain detailed data based on time, finances and the human capital involved.

Equation 1: Formula for Determination of Sample Size (Yamane, 1967);

$$\boldsymbol{n = \frac{N}{1+Ne^2}}$$

Where:

$\boldsymbol{n}$= the sample sizes N = the population size $\boldsymbol{e^2}$ = desired level of statistical significance (0.05)

Therefore;

$$\boldsymbol{n = \frac{N}{1+Ne^2} = \frac{3450}{1+3450(0.05)^2} =\approx 358}$$

Thus, the study adopted a sample of 359 respondents that will be a representative of the study sample of the target population.

To determine the sample size of each i^{th} item, the study used proportionate stratified random sampling for two categories of the sample, namely, the 3,225 learners and 225 head teachers. A proportion of the sample size was thus computed, and this proportion was used to determine the number of respondents in each stratum (i^{th} item) examined. The proportion was calculated based on the following formula:

$$\boldsymbol{Proportion = \frac{Sample\ size\ (n)}{Population\ size\ (N)} = \frac{359}{3450} = 0.1041}$$

Therefore, the i^{th}item sample size will be as calculated in table 3.2 below:

Great Journs
ISSN: 2328-4870
Vol.1 No.2, July, 2025
Journal homepage: www.greatjourns.com

Table 3.2 Study population, sampling technique and sample size

Category	Population Size	Proportion	Sample size	Sampling technique
Education officers	11		11	Census method
Head teachers	225	0.1041	23	Proportionate stratified random sampling
Learners	3,225	0.1041	335	Proportionate stratified random sampling
Total			369	

Source: Researcher, 2025

From the above formulae, table 3.2 was generated to show a sample size of 23 headteachers selected as respondents of the study from 225 population and the specific respondents were picked by simple random sampling technique. The census method was used to select 11 education officers and stratified random sampling was used to select 335 learners from a population of 3,225. Makwama, Engineer, Dhabi, & Chudasama, (2023) affirm these methods as suitable when working with distinct subgroups to achieve the range through which values of the subgroups are estimated, control sample bias, save costs and improve quality of the data analysed.

A census method was preferred to select 11 education officers to represent the 11 sub-counties within Turkana County in order to reach every part of the county to present a true data of the interior areas where junior schools exist. Further, it gave the research the precision, provided adequate confidence level and the variability to show the entire spectrum of the County status and effectiveness of the management successes and challenges experienced. According to Hossan & Alhasnawi, (2023) a census involves every unit in a population that is selected for a test. Therefore, a total of 369 respondents was the sample size for this research.

3.6 Data Collection Instruments

There are two sources of data which were used; primary and secondary data. The primary data is that which is collected first hand from the field. On the other hand, data which is collected from other existing sources is referred to as secondary data. This study used both secondary and primary data sources. Secondary data was obtained from official records of junior schools. In order to achieve this task, data collection was carried out in the eleven sub-counties of Turkana County from 23 sampled schools.

3.6.1 Questionnaires

This tool was used for collecting data from learners. In collecting primary data, structured questionnaires were used. The study developed statements for each of the study variables where respondents were asked to indicate their level of understanding and personal experiences of the CBE curriculum. They recorded their respondents and ideas in blank spaces provided.

Thus, the questionnaire was used to collect both quantitative and qualitative data. Open ended questions and closed-ended questions were developed in order to generate data. This tool was appropriate for the study since it took less time to respond to the questions as well as provide an opportunity for the researcher to code the responses and ascertain the percentile on responses.

3.6.2 Learners' questionnaire

Questionnaires were administered to 335 sample size of junior school learners in grade seven, eight and nine. The questions comprised of close-ended and some open-ended questions. The questionnaires were designed to collect both quantitative and qualitative data. The sections of the questionnaires were: demographic section (4), frequency of using the facility (4), questions on learning outcome (9) and section on utilization of teaching materials (4).

3.6.3 Head Teachers' Interview Guide

The sampled 23 headteachers were asked to respond to structured questions on areas relevant to the research study. The interview guide had five parts that were referred to as sections. Each part had a specific area to address on the management aspects of teaching and learning resources and their thoughts on the parental role in CBE understanding and appreciation.

The headteacher's interview guides were divided into five areas: demographic information as section A with 4 questions, section B 5 questions on physical infrastructure, Section C 5 question on the role of teachers in the realizing teachers role, section D 5 question on teaching resources and section E 6 questions on the management interventions.

3.6.4 Interview Schedules for Education Officers

There will be interview schedule for which were administered through face-to-face interviews or video conference and phone calls involving the researcher approaching respondents to seek consent and create time for the interview of the education officer(s). The researcher, after introduction, asked respondents prepared questions and with their permission take notes of the responses given. Some of the officers agreed to recording of their responses. The responses rate for face-to-face interviews is higher than postal questionnaires as the researcher has the opportunity to sell the research to a potential respondent, Kelley (2003). This was important to obtain primary data that was detailed for ease of in-depth description of data.

The interview schedules included the following sections: section (a) self-introduction (4), section (b) interview guide rules (4), section (c) relevance of the interview the education officer (10), section d monitoring implementation of CBC in junior secondary school (4) and section (e) managerial interventions to realize learning outcomes (6).

3.6.5 Observation guide

A checklist on the observable infrastructure and teaching and learning materials was used to gather the data on their availability and the condition that the infrastructure was in. This was to ascertain the usability especially on the learning outcomes that required practical knowledge. The observation had two sections with section (a) being infrastructure and section (b) focused on teaching and learning materials.

3.6.6 Document Analysis

The study carried out document analysis to obtain data on CBC learning outcomes in Junior Secondary Schools from head teachers as well as education officers in the sub-counties of Turkana County. These documents included the enrolment records in junior schools that helped in retrieving relevant secondary data to be used in the research. One of the key areas here was to determine the relevant of the resources available in relation to the school population.

The following documents were duly analysed: monthly enrolment returns, school inventory books on infrastructure repairs and maintenance, results rubrics for CBE assessments, school admission register, school registers for learners in junior school.

3.7 Validity and Reliability

This study reviewed validity and reliability in the study following specific procedures to administer and test the research instruments mentioned above.

3.7.1 Validity

Validity was tested using content and construct validity. Content validity was done by the supervisors as to whether the instruments adequately covered the areas and variables under the study. The supervisors from the Department of Educational Planning and Management of Kibabii university reviewed the content of the instruments and suggested adjustments to meet the standard measure of the research instruments. A pilot study was conducted in Pokot South Sub- County, West Pokot County in three junior schools and ascertained the construct and content validity that seek to show correlations between the variables of this study.

3.7.2 Reliability

Test-retest reliability is a statistical technique used to estimate components of measurement error by repeating the measurement process on the same subjects, under similar conditions as the actual area of study since both areas have similarity in the social and geographical placement, and comparing the observations Matheson, (2019). Reliability of the instruments was based on the responses on the question items of the research instruments. Together with the supervisors, a review was done to assess the consistency of results from the responses and adjustments done. For instance, reliability of the close-ended and open-ended question items were tested through the test re-test approach to three schools in Pokot South Subcounty, West Pokot County. This was carried out two times to check the consistency in the responses obtained. The results of the two trials generated a correlation and a co-efficient of correlation of r = 0.765 which denoted reliability since it was above r = 0.7 which was the minimal recommended correlation as per the Pearson's Moment Correlation Coefficient statistical method of testing relationships between variables.

3.8 Data Collection Procedure

The researcher obtained a research approval letter from the School of Graduate Studies that was used to apply for a research permit from the National Commission of Science and Technology and Innovation (NACOSTI). After obtaining a research permit from NACOSTI, the researcher sought clearance from the relevant Education offices in Turkana County to carry out the research starting with the Ministry of Education Official, County Director of Education office, the subcounty directors of education and headteachers of institutions. After clearance by the County Education Ministry officials and other relevant bodies, the researcher proceeded to schools and sought appointment, then obtained permission from headteachers as per their convenience and availability and then, established rapport with respondents for actual collection of data in administering questionnaires as well as interviewing head of schools.

3.9 Data Analysis Methods

A parallel analysis of the qualitative and quantitative analysis was used on the data collected. The qualitative data was analysed through descriptive statistical data analysis which included organizing data based on the recurring themes, coding and interpreting data using measures of central tendency (means, median, and standard deviation), trend analysis, frequencies, and percentages. The second analysis of quantitative data was inferential statistical analysis of the quantitative data using Pearson Moment Correlation and regression analysis. The correlation and regression analysis was used to show the relationship between variables and test the hypothesis of this study. Ultimately, the study adopted a convergent model of analysis where both qualitative and quantitative data was gathered simultaneously and then merging the analysis in convergent model. Younas & Sundus, (2022) states that a convergent model is an approach where analysis and integration was a case-by-case integration of various levels by identifying linkages within cases across the whole data set and focusing on relational connections and emerging patterns.

3.10 Ethical Considerations

The study observed principles of confidentiality, anonymity, informed consent and anti-plagiarism. Consequently, prior information was given to the respondents through appointments, and phone calls made for follow ups that sought the permission and consent of the participants to willingly and freely accept to respond to the research questions.

Further, all respondents were assured of confidentiality of the information obtained since it was explained that the process was meant for academic purposes and not any other benefit or gain. Also, consent was obtained from the learners through their headteachers and class teachers who asked only those willing to participate in the questionnaire process were allowed. They were instructed to avoid writing their names on the questionnaires to maintain anonymity and inspire genuineness in their responses.

Also, time allocation was strictly adhered to in the interviews to maintain trust and focus on key areas necessary. Professionalism was also observed to avoid biases in responses and encouraged focused responses to the questions and of course keeping to the time of the appointment was a necessary ethical consideration to avoid keeping respondents waiting since majority were busy and engaged. Further, the findings and final copies of this document was subjected to anti-plagiarism checker to ensure originality of the research outcome.

Great Journs
ISSN: 2328-4870
Vol.1 No.2, July, 2025

Journal homepage: www.greatjourns.com

IV: RESULTS

4.1 Management of Physical Infrastructure and Learning Outcomes

The physical infrastructure was necessary for learning to take place. Thus, the study undertook an assessment through observation on various management aspects with regard to the physical infrastructure, their availability and the state they are in and how they relate to learning outcomes. The findings were as presented as below.

4.4.1 State of Physical Infrastructure

The study investigated the state on physical infrastructure in institutions using the observation guide. The calculated mean of the schools that were investigated was 1.2/5.0 with a SD of 3.8 of the 23 schools observed in the study. The infrastructure index, calculated based on availability and condition of classrooms, laboratories, libraries, playgrounds, and other essential facilities, is presented in table 4.5 below.

Table 4.1: Infrastructure Index Statistics

Measure	Value
Mean Score	1.2/5.0
Standard Deviation	3.8
Facilities requiring repair or upgrade	65%

Table 4.1 shows a mean score of 1.2 out of 5.0 (SD = 3.8). This low mean of 1.2 indicates that on average, schools scored only 24% of the maximum infrastructure quality meaning there are generally poor infrastructure conditions across the county. The highest Standard Deviation of 8 is particularly a concern because it shows that there is massive variability between schools, some schools had near to zero infrastructure while other might be relatively better equipped. The condition assessment in table 4.5 reveals that even where infrastructure exists, maintenance challenges are prevalent. The statistics revealed severe infrastructure crisis that fundamentally undermines the CBE learning outcomes. It points to the fact that schools achieve less than one quarter of acceptable infrastructure quality, representing a severe infrastructural deficit that undermine delivery of teaching and learning services in the schools. Therefore, most essential facilities are either absent, non-functional or in extremely poor conditions. A SD of 3.8 demonstrates lack of the necessary teaching and learning physical infrastructure and thus, the gap between schools is enormous creating severe educational inequity. Approximately 65% of existing facilities required significant repairs or upgrades to meet CBE implementation standards. This suggests a compounding crisis where poor initial infrastructure is further degraded by inadequate maintenance.

The statistical implications of educational equity suggests systemic infrastructure failure with some schools have no basic infrastructure while others have adequacy creating inequitable education system. It also posits that there are limited resources that even continue to deteriorate and so learners from the worst hit schools face multiple infrastructure barriers that are necessary for realising the learning outcomes under CBE system. Therefore, a further examination of the data yielded a table 4.6 to present the status or condition of the physical infrastructure assessed in the study.

Great Journs
ISSN: 2328-4870
Vol.1 No.2, July, 2025

Journal homepage: www.greatjourns.com

Table 4.2: Physical Infrastructure Assessment

Infrastructure Component	Availability (%)	Condition
Classrooms	100	Student-classroom ratio 52:1
Science Laboratory	34.3	Mostly inadequate
ICT laboratory	12.9	Very limited
Library	42.9	Poorly stocked
Playground	71.4	Variable quality

The analysis of physical infrastructure in table 4.2 revealed significant disparities across junior schools in Turkana County. Classroom adequacy emerged as a critical challenge, with student-classroom ratios averaging 52:1, significantly exceeding the recommended national standard of 35:1. This show that the schools are handling 13 additional learners against the recommended national standards leading to overcrowding that directly affect teaching and learning of individualised setting of CBE system. Laboratory facilities were particularly inadequate, with only 34.3% of schools having functional science laboratories and merely 12.9% possessing ICT laboratories. A large number of about 65.7% of schools reported to have no laboratories. This severely affects the integrated sciences which are at the centre of CBE methodology and philosophy. Hence, learners in nearly 2 out of every 3 schools cannot access practical on scientific experiments. On other hand, ICT laboratories reported in 12.9% of the schools means that 87.1% of the schools have no ICT facilities. This creates a gap in digital literacy learning as about 1 in 8 school can provide computer-based learning leading to as serious gap in the digital learning area of CBE. Therefore, this affects the learning outcomes of majority of the learning in most schools in Turkana County. Library facilities existed in 42.9% of schools, though most were poorly stocked with limited relevance to CBE learning areas. The library resource limitation points to a shortage of teaching resources with many schools having to do with improvising e-learning materials that can be accessed through long distances to get networks or printing services for materials downloaded. Playground availability was more favourable at 71.4% of schools, though quality and maintenance varied considerably. From the findings, it is the only infrastructure to have a large availability despite poor conditions, the varied quality and maintenance qualifier suggests many are inadequate for structured physical education programs. Apparently 28.6% of schools still lack basic playground facilities and they have to improvise the playground facilities.

Therefore, the data above provides empirical evidence that infrastructure barriers, not pedagogical resistance are primary constraint to effective management of CBE teaching and learning resources that affect the learning outcomes. Further, the infrastructure

V: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Summary

The investigation revealed substantial infrastructure deficiencies across junior schools in Turkana County, with an overall infrastructure adequacy index of 2.8 out of 5.0. Student-classroom ratios averaged 48:1, significantly exceeding the national standard of 35:1. Laboratory facilities were particularly inadequate, with only 34.3% of schools maintaining functional science laboratories and merely 12.9% possessing Information and Communication Technology (ICT) laboratories that are somewhat functional for the purpose of the learning process and learner achievement of the initial objective of CBE.

Despite these constraints, the research established a strong positive correlation ($r = 0.687$, $p < 0.01$) between physical infrastructure management and CBE learning outcomes. The statistical significance ($p < 0.01$) provided compelling evidence to reject the null hypothesis (H_{01}) that there is no significant relationship between management of physical infrastructure and learning outcomes in junior schools. The regression analysis ($R^2 = 0.472$, $F = 156.8$, $p < 0.001$) further confirmed this relationship, with infrastructure management accounting for 47.2% of the variance in learning outcomes. This substantial effect size demonstrates that effective utilization and maintenance of existing

facilities substantially enhance educational achievement. Schools implementing creative infrastructure utilization strategies achieved better learning outcomes compared to institutions with similar resources but inadequate management practices.

5.2 Conclusions

The research conclusively show that educational management dimensions complement each other in order to influence CBE learning outcomes in junior schools in Turkana County. Therefore, no single dimension operates in isolation; rather, the combined effect of infrastructure management, teacher management, materials availability, and management interventions produce optimal educational results. This conclusion validates the theoretical framework of educational institutions as complex systems requiring comprehensive management approaches.

5.3 Recommendations for Educational Policy

The Kenya Ministry of Education should develop and enforce minimum standards for educational management across all dimensions studied. These standards should specify threshold levels for infrastructure adequacy, teacher qualifications, materials availability, and management intervention capacity. Priority should be given to helping schools achieve these minimum thresholds rather than distributing resources uniformly across all institutions.

REFERENCES

Aina, J. K., & Abdulwasiu, A. A. (2023). Teacher's effective use of educational resources and their effect on students' learning. Universitepark Bulten, 12(2), 83-89. https://doi.org/10.22531/unibulletin.2023.122.4

Ali, S. S. (2023). Teachers role in outcome-based education. Medicon Engineering Themes, 1(4). https://doi.org/10.55162/MCET.04.101

Amagove, B., Limboro, C., & Itolondo, W. (2024). Parental involvement in the implementation of competency-based curriculum. *International Journal of Research and Innovation in Social Science*, *8*(8), 2055-2062. https://dx.doi.org/10.47772/IJRISS.2024.8080151

Ampofo, J. A. (2021). The effects of using teaching and resource materials on the academic performance of students in integrated science at Adansi Atobiase D/A Junior High School in Ghana. https://www.researchgate.net/publication/350688951

Amutabi, M. N. (2019). Competency based curriculum (CBC) and the end of an era in Kenya's education sector: Some empirical reflections. Journal of Popular Education in Africa, 3(10), 45-66. https://doi.org/10.46769/jopea.252328004413713080

Barnes, N., Plessis, M. D., & Frantz, J. (2022). Components to consider for an academic career management intervention programme: A concept mapping approach. Journal of African Education, 3(2), 125-154. https://doi.org/10.31920/2633-2930/2022/v3n2a5

Banerjee, S. B. (2022). Decolonizing management theory: A critical perspective. Journal of Management Studies, 59(4), 1074-1087. DoI: 10.1111/joms.12756

Bruton, G. D., Zahra, S. A., Van de Ven, A. H., & Hitt, M. A. (2022). Indigenous theory uses, abuses, and future. Journal of Management Studies, 59(4), 1057-1073. https://doi.org/10.1111/joms.12755

Cheptoo, R. (2019). The "Africanized" competency-based curriculum: The twenty-first century strides. International Journal of Education, 7(4), 46-51. https://doi.org/10.34293/education.v7i4.640

Dovetail Editorial Team. (2023, November 20). What is mixed methods research? Dovetail Research Pty. Ltd. https://dovetail.com/research/mixed-methods-research/

George, T. (2021). Mixed methods research: Definition, guide and examples. Scribbr. https://www.scribbr.com/methodology/mixed-methods-research/

Goshu, B. S., & Woldeamanuel, M. M. (2019). Education quality challenges in Ethiopian secondary schools. Journal of Education, Society and Behavioural Science, 31(2), 1-15. https://doi.org/10.9734/jesbs/2019/v31i230147

Green, S. K., & Gredler, M. E. (2019). A review and analysis of constructivism for school-based practice. School Psychology Review, 31(1), 53-70. https://doi.org/10.1080/02796015.2002.12086142

Hossan, D., & Alhasnawi, M. (2023, July 22). Sample size and sampling methods. https://www.researchgate.net/publication/372518813_sample_size_and_sampling_methods

Hwa, Y. Y., & Leaver, C. (2021). Management in education systems. Oxford Review of Economic Policy, 37(2), 367-391. https://doi.org/10.1093/oxrep/grab004

Jeptoo, N. (2024). Role of volunteerism as a parental involvement strategy in the achievement of core competencies among learners in public primary schools in Nandi County, Kenya. *Research Journal of Education Teaching and Curriculum Studies*, *2*(1), 25-34. https://doi.org/10.58721/rjetcs.v2i1.599