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SUSTAINABILITY PLANS FOR RESOURCES MEANT FOR TEACHING VOCATIONAL AGRICULTURE FOR COMPETENCE-BASED GRADE FOUR AGRICULTURE IN PUBLIC PRIMARY SCHOOLS NJORO SUB-COUNTY

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Abstract

The purpose of this paper was to examine the sustainability plans put into place for teaching and learning resources by public primary schools in the Njoro Sub-County of Kenya. The setting created an ideal opportunity to evaluate the ways teaching and learning resources are stored, and the replacement of damaged, lost, and malfunctioning tools and resources. In addition, the study evaluated the maintenance schedule/program for various resources. The study sample consists of 96 public primary schools in Njoro sub-County. The results indicated that storage of teaching and learning resources was collective responsibility among parents, teachers, the school, and students. More than 63% of parents stored farm tools, 70% of students kept textbooks and the schools kept laptops, tablets, flash disks, and pictures. Concerning replacement and repair resources, 70.8% of parents stored farm tools, while 92.7% of the camera, 95.8% of memory cards, and 96.9% of pictures were not replaced. Schools and KICD were responsible for tablets and laptop replacements. In addition, results indicated that 51% of teachers had a maintenance schedule every month, 6.3% had maintenance after every two terms, 7.3% had a schedule for maintenance after a year and 35.4% said they had no maintenance schedule.

Keywords: *Sustainability, Vocational Agriculture, Public, primary schools, resources*

1. Introduction

Teachers perform their duties when they have enough resources. It is vital that teachers select materials for vocational subjects with the type of students pursuing vocational awards in mind. In general, students who study more "vocational" subjects develop a different set of skills than those who study subjects that are more “traditional”. "Hands-on" learning experiences may be beneficial for students, especially those with special needs (Jabarullah & Hussain, 2019)

Competency-based education enables students to progress at their speed, based on their mastery of a skill or competency, regardless of the context in which they are learning. This strategy is flexible enough to accommodate a wide range of student learning styles and strengths, and it has the potential to improve academic performance (MoE, 2019). This study refers to an education

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that enables learners to apply learned knowledge, skills, and attitude adequately in a place of work, school, or at a personal level. The introduction of Competence Based Education (CBE) in Kenya aims at ensuring school graduates have competencies that will enable them to meet societal needs like sustainable agriculture and environmental conservation. For instance, the introduction of agriculture subjects in Kenyan primary schools starting at grade four aims at promoting digital literacy, critical thinking good communication, and problem-solving competencies. The competencies are considered to help students actively participate in activities that seek to enhance environmental conservation and contribute toward the goal of achieving food security by making creative use of the limited agricultural resources available. In addition, agriculture focuses on enabling learners rear small domestic animals as a profitable agricultural enterprise for self-sustainability and economic development (Kenya Institute of Curriculum Development(KICD), 2018). Therefore, primary schools need to have adequate teaching and learning resources for practical teaching. In addition, the sustainability of the resources is vital, as it will enable the schools to spend less finance for the re-purchase of resources. Some of the critical resources used in teaching grade four agriculture are ICT tools (laptops, tablets, cameras, and flash disks), farm tools and equipment, charts, pictures, and textbooks (Muia, 2021). Therefore, if schools have no framework that helps them in promoting the longevity of the resources meant for agriculture teaching, the damaged resources and malfunctioning tools and equipment will be abandoned. This will inevitably lead to the theoretical teaching of vocational subjects. Thus, it will compromise the learners' acquisition of competencies.

With that regard, this journal article sought to evaluate the sustainability plans in place for teaching grade four agriculture subjects among public primary schools at Njoro Sub-county. The sustainability was limited to how schools stored resources, the replacement of resources, and the maintenance schedule in place. The following are the guiding questions of the study;

a) How do institutions store the resources used for teaching and learning agriculture?
b) How the replacement of lost damaged and malfunctioning tools and resources for teaching agriculture was enhanced?
c) What is the maintenance schedule for the resources used for teaching agriculture?

2. Review of Literature

The sustainability of teaching and learning resources is significant in ensuring the practical teaching of vocational subjects (Singhavi & Basargekar, 2019). Preserving a high standard of teaching is one of India's most pressing problems. The lack of basic infrastructure and high-quality teachers has a devastating effect on public schools in rural areas and outlying settlements. To promote education quality and equity, the Indian government provided schools with information Communication Technology resources (ICT) to increase students' digital literacy skills. However, it was observed that teachers did not incorporate ICT in classroom instruction as they cited insufficient funding, a lack of clear goals, poorly trained staff, ineffective monitoring and feedback mechanisms, broken or poorly maintained equipment, and a dearth of high-quality educational content made available through information and communication technologies. In South Africa, according to (van Dyk & White, 2019) the schools that do not

have resources for teaching vocational subjects recorded poor results compared to schools that had adequate teaching and learning resources. The adequacy of resources is achieved by continuous repair of existing resources with a steady supply of learning materials to bridge the gap. The South African context has made some schools attract more students while others have a few populations of students. Therefore, this implies that there is a high extent of competence imbalance among students when comparing those with well-established learning resources with those that lack resources. Vocational subjects require numerous resources to ensure students acquire key competencies of the 21st Century. Teachers develop stress and burnout when they work in an environment that is not favorable. Resources increase teacher efficiency thus improving students' academic results (Herman et al., 2020). In the Kenyan context, one of the most important aspects of rolling out the 8-4-4 curriculum was making sure teachers had the materials they needed to teach. Agriculture workshops with metal and woodworking tools, gas and electric welders, tractors, power generators, cultivators, fuel storage tanks, combined harvesters, science labs, laboratory facilities, school farms, departmental vehicles, and operating funds were the primary resources for teaching agriculture. Unfortunately, the given machinery and equipment fell into the hands of teachers who were unable or unwilling to manage them properly due to a lack of knowledge about how to repair and maintain them. This was due to institutions not having long-term strategies in place to retain technical staff (Seraphine et al., 2018). Resources used in teaching vocational subjects need repair storage, modification, and maintenance practices for continued utilization over some time (Rufai & Muhammad, 2013). The area needed to store harvested crops is different from the area needed to house computer servers and other IT equipment thus schools need special storage facilities for teaching and learning resources. Students in Kenya primary schools are expected to show they can harvest crops, maintain tools and equipment, and clean up after a harvest as guided by according to curriculum Curricula framework under CBE. Therefore for agricultural tools like jembe, slasher, panga, wheelbarrow, and watering cans to last longer, schools are expected to promote good maintenance practices (MoE, 2019). However, some tools, equipment, and facilities' sustainability require an extra resource person for increased durability. For example, ICT tools require an expert who will be monitoring and controlling the use of the internet and computers. A grade four learner is expected to collaborate with an ICT resource person to guide him/her on methods of storing photos.

This study was guided by Resource-Based Theory, also known as the Resource-Based View (RBV) or Resource-Based Approach, which is a management theory that focuses on the role of resources in organizations' competitive advantage. According to RBV, resources are critical for organizations to achieve superior performance and sustain a competitive edge over time. Resources can be tangible or intangible assets, such as physical assets, financial capital, human capital, and organizational capabilities (Collins, 2021). RBV argues that not all resources are equal in their strategic value. Resources that are rare, unique, difficult to imitate, and not easily substitutable by competitors can provide a sustainable competitive advantage to organizations.

These resources, often referred to as strategic resources, allow organizations to differentiate themselves from competitors and create value for customers.

Effective resource management is crucial in RBV. Organizations need to identify, acquire, develop, deploy, and maintain resources in alignment with their strategic objectives. This involves making strategic decisions on resource allocation, utilization, and renewal to maximize their competitive advantage (Zahra, 2021). Organizations also need to build capabilities to integrate and leverage resources effectively, including through innovation, organizational learning, and strategic partnerships. In addition, RBV recognizes that resources can be dynamic and may change over time. Organizations need to continually adapt and renew their resources to sustain their competitive advantage in a constantly evolving business environment. This may involve investing in resource development, innovation, and strategic resource reallocation.

Resource-Based Theory suggests that the availability and utilization of resources, such as teaching materials, tools, and equipment, are crucial for teachers to effectively perform their duties. The theory emphasizes that resources need to be managed and maintained appropriately to ensure their longevity and effectiveness in supporting teaching and learning. The guiding questions of the study revolve around how schools store, replace, and maintain the resources used for teaching agriculture. These questions align with the key concepts of Resource-Based Theory, as they focus on the management and sustainability of resources in an educational setting. The study aims to investigate whether schools have proper plans and strategies in place to store, replace, and maintain the resources needed for teaching agriculture, which directly relates to the theory's emphasis on the importance of resources in facilitating effective performance. Furthermore, the study also highlights the importance of competency-based education, which is a flexible approach that allows students to progress at their own pace based on their mastery of skills or competencies. This aligns with the Resource-Based Theory, as competency-based education requires appropriate resources to support students' learning and mastery of competencies.

3. Methodology

3.1. Research Design

The methodology used in this study followed a descriptive research design, employing a quantitative approach to collect and analyze data. The study was conducted in Noro Sub-County of Kenya, which provided an ideal setting to examine the sustainability plans for teaching and learning resources in public primary schools.

3.2. Sampling

Census was used to collect data from 96 public primary schools in Njoro sub-County. Census was considered the ideal method because the schools are spread across the interior and exterior

geographical locations of Njoro Sub-County. Therefore, full enumeration helped the study to determine the sustainability the schools had in place.

3.3. Data Collection

Data was collected through structured questionnaires administered to teachers. The questionnaire was designed to gather information on the storage, replacement, and maintenance of teaching and learning resources. The questionnaire was distributed to the participants and collected after completion.

3.4. Data Analysis

The collected data was analyzed using descriptive statistics, including frequencies and percentages. The data was organized and coded for analysis using statistical software (SPSS version 25). The findings were presented in tables and charts to facilitate interpretation and comparison

4.Results and Discussion

4.1. Storage of the Instructional Resources Used for Teaching Agriculture

The study sought to determine how the institutions stored the resources used for teaching and learning agriculture subjects and the results were tabulated in Table 1.

Table 1. *Storage of the Instructional Resources Used for Teaching Agriculture*

Resource	Pupils keep	Kept in class	Special rooms	No keeping/storing
Charts	13.5%	62.5%	24%	-
Farm tools	63.5%	9.4%	22.9%	4.2%
Tablets	-	-	100%	-
Drawings	18.8%	66.7%	11.5%	3.1%
Flash disk	-	-	100%	-
Laptops	-	-	100%	-
Memory card	-	-	100%	-
DVD	-	-	100%	-
Textbooks	70.8%	-	29.2%	-
Models	6.3%	37.5%	52.1%	-
Pictures	16.7%	59.4%	24.0%	-
Realia		9.4%	25%	65.6%

The results in Table 1, indicate all the entire grade four teachers of agriculture confirmed they kept tablets, laptops, flash disks, memory cards, and CDs/DVDs in the computer room/store. In the storage of farm tools, many teachers (63.5%) replied that students kept the farm tools at home, while 4.2% of teachers said they did not keep any farm tools. The majority of students kept farm tools because schools had inadequate resources and when the students were needed to carry out farm activities, they were required to report to school with the farm tools. Other schools had no agriculture store thus teachers of agriculture did not keep farm tools. Another possible reason for the 4.2% failing to store the farm tools was the result of some schools lacking schools farms thus teachers of agriculture opted for theoretical teaching or they taught using video clips, the internet, and tablets on how to carry out various farm activities.

For storage of drawings (66.7%), pictures (59.4%), and charts (62.5%) teachers of agriculture said they kept them in class. The drawings, pictures, and charts kept in class were mounted on the wall or folded and piled at the back of the class since mounting all the teaching materials in class may become distractors or cause a conflict of interest since other teachers may also need to put some charts on the wall. In the storage of realia, 65.6% of teachers never kept them. The possible reason was that the teachers were taught on using locally available materials during CBE training thus finding it easy to obtain realia whenever needed. Another reason was that the teachers do not use realia in teaching and learning about agriculture.

4.2 Replacement of Lost, Damaged, or Malfunctioning resources

Respondents were asked how they enhanced the replacement of lost damaged and malfunctioning tools and resources for teaching agriculture and the findings were tabulated as indicated in Table 2.

Table 2: *Replacement of Lost, Damaged, or Malfunctioning resources*

Resource	(Agriculture teachers) re-construct/re-draw/repair /buy	Parents buy	the school replace	KICD	No replacement
Camera	7.3%	-	-	-	92.7%
Charts	57.3%	3.1%	22.9%	3.1%	13.5%
Farm tools	-	70.8%	32.3%		-
Tablets	-	-	82.1%	4.2%	13.8%
Laptops	-	-	37.5%	62.5%	-
Smartphones	100%	-	-	-	-
Drawings	74%	4.2%	3.0%	-	18.8%
Flash disk	4.2%	-	-	-	95.8%
Memory card	3.8%	-	-	-	96.2%
CD/DVD)	11.5%	-	-	-	88.5%
Textbooks		57.3%	30.2%	12.5%	
Models	18.8%	-	13.5%	9.4	58.3%
Pictures	-	3.1%	-	-	96.9%
Realia	-	3.1%	-	13.5%	83.3%

The study found that all of the teachers used their smartphones in teaching despite having tablets at schools. The teachers said that in the event smartphones were lost or damaged while used in teaching learners, it was the responsibility of the teacher to purchase or repair them. In addition, since some resources like cameras, teachers, in the event of damage, bought memory cards, CD/DVD, and realia or malfunctioning teachers said there was no replacement. For instance, 83.3% of teachers cited that they never replaced realia after teaching. The possible reason could be that teachers were able to use locally available material for teaching and learning.

At least 70.8% of teachers observed that parents took the responsibility of replacing lost farm tools since schools had inadequate resources. However, 32.3% of the teachers said the school replaced the farm tools. This implies that the schools that replaced lost farm tools had well-established school farms that needed continuous use of farm tools. In addition, 96.9% of teachers said that if pictures were lost they had no replacement means something that could be a result of teachers storing pictures on tablets and their smartphones which they have not been taught how to restore deleted pictures in the electronic devices. The laptops used by teachers were replaced by KICD. For instance, 62.5% of teachers confirmed that the KICD had the mandate to replace spoiled laptops. The possible reason could be that the laptops used in schools have been configured by KICD and the teachers may not get a replacement in ordinary shops. The schools had the mandate to replace some resources like charts (22.9%), farm tools (32.3%), tablets (82.1%), and textbooks (30.2%). The findings of this study are in tandem with MoE (2019) guidelines on the care, replacement, and maintenance of teaching and learning resources. The MoE (2019) cited that the replacement of teaching and learning resources should be a collective responsibility of the school, parents, KICD, and teachers.

4.3 Maintenance Schedule for the Resources Used for Teaching Agriculture

Figure 1 presents the maintenance schedule for resources that grade four teachers of agriculture used in their teaching and learning process.

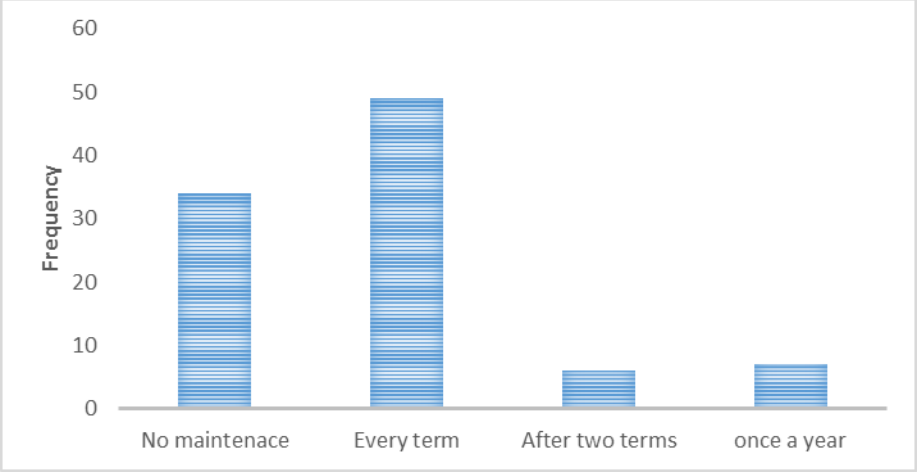

Figure 1: *Maintenance Schedule for the Resources Used for Teaching Agriculture*

The maintenance includes but is not limited to covering books, gluing, sharpening, oiling metal parts, and dusting. The maintenance schedule was every term, after two terms, once a year, and with no maintenance. It was observed that 51% of teachers had a maintenance schedule every term, 6.3% had maintenance after every two terms, 7.3% had a schedule for maintenance after a year and 35.4% said they had no maintenance schedule. The possible reason for a no-maintenance program could be that the schools do not have resources that require frequent maintenance. Another reason why the grade four agriculture teacher had no maintenance program could be that some resources require a resource person to help repair the resources. For instance, in two out of ninety-six schools, the teachers reported that the tablets were spoiled but they had not repaired them since they had no idea where to take them for repair and the guidelines to be followed in repair. The finding of this study is in tandem with results obtained by Mucheru (2015) where it was confirmed that teaching and learning resources in primary schools lacked a proper maintenance schedule since the materials used were expensive and teachers could not afford them.

The 51% of the schools that had a maintenance program are likely to spend fewer resources as opposed to schools that had no maintenance or the ones that did a maintenance program once a year. The findings of this study are in agreement with a study conducted by Uchendu et al.(2013) in Nigeria on resource maintenance for sustainable development. According to Uchendu et al. (2013), many schools in Nigeria were found to spend a lot of money on purchasing resources meant for teaching vocational subjects every year due to irregular maintenance schedules. However, the study recommended that the schools should develop workshops in schools to repair and replace worn-out tools, development of an inventory book by every school to take a record of resources that needs repair, and have a clear record showing resources repaired by whom and at the time. A report by Melamchi (2019) recommends that maintenance programs should be for infrastructure and instructional resources whereby the maintenance was categorized into corrective maintenance, emergency maintenance, and periodic maintenance. Corrective maintenance focuses on repair and replacement, an emergency is associated with the failure of lab equipment while periodic refers to monthly, per term, or year. In addition, the report indicated that schools should use posters guiding students on maintenance programs. A report by the United States Environmental Protection Agency (2019) indicated that lack of repair and maintenance for resources and facilities had a negative influence on students' health and academic achievement. The report cited that classrooms with irregular dusting and painting caused students serious respiratory diseases and breathing difficulties. The tools that did not undergo sharpening, repair, and replacement caused students physical injuries during practical activities. The 35.4% of schools with no maintenance program are at risk of interrupting learning activities in the event a resource or a facility fails operations. Frequent repair and maintenance of resources give an institution a predictive avenue on the status of its resources. A study by King (2022) cited that non-repaired resources become destructors for learners during the learning process as their attention shifts towards the status of the resources thus reducing

students' concentration. In addition, the schools with no maintenance programs were subject to accidents, which interfered with the teaching process.

5. Conclusions

Based on the study findings, the study concludes that 100% of schools kept tablets, laptops, flash disks, memory cards, and CDs/DVDs in the computer room/store and students kept the textbooks. In addition, in most schools (63%) the students kept farm tools at their homes. Regarding the replacement of lost, damaged, or malfunctioning tools and resources, 70.8% of parents were responsible for replacing farm tools, and 62.5% of teachers confirmed that the KICD had the mandate to replace spoiled laptops. It was observed that 51% of teachers had a maintenance schedule for teaching and learning resources every month, 6.3% had maintenance after every two terms, 7.3% had a schedule for maintenance after a year and 35.4% said they had no maintenance schedule.

6. Recommendations

i. Strengthening Collaborative Efforts: The study revealed that the storage of teaching and learning resources was a collective responsibility among parents, teachers, students, and schools. Therefore, it is recommended to further strengthen collaborative efforts among all stakeholders to ensure proper storage and management of resources. This can include developing clear guidelines and procedures for resource storage, establishing effective communication channels, and involving parents and students in resource management initiatives.

ii. Enhancing Replacement and Repair Mechanisms: The study found that there were gaps in the replacement and repair of teaching and learning resources, with a significant percentage of resources not being replaced or repaired. It is recommended to improve replacement and repair mechanisms by establishing clear procedures for reporting damaged, lost, or malfunctioning resources, and ensuring timely and efficient replacement or repair actions. This may involve allocating a sufficient budget for resource maintenance and replacement and engaging relevant stakeholders such as the Kenya Institute of Curriculum Development (KICD) for support.

iii. Developing Maintenance Schedules: The study revealed that a significant percentage of teachers did not have a maintenance schedule for teaching and learning resources. It is recommended to develop and implement regular maintenance schedules for various resources to ensure their durability and effectiveness. This can include regular inspections, cleaning, and repairs, as well as training teachers and other staff on maintenance procedures. Additionally, it is important to allocate resources and budget for maintenance activities in school budgets.

iv. Providing Training and Support: The study showed that teachers lacked proper knowledge and skills in resource management. Therefore, it is recommended to provide

training and support to teachers, parents, and students on effective storage, replacement, and maintenance practices. This can include workshops, seminars, and information sessions on resource management, as well as providing access to relevant resources, guidelines, and tools to support their efforts.

v. Monitoring and Evaluation: It is recommended to establish a system for monitoring and evaluating the sustainability plans for teaching and learning resources in public primary schools. This can involve regular assessments of resource storage, replacement, and maintenance practices, as well as evaluating the effectiveness of training and support programs. The findings from monitoring and evaluation can inform future improvements and adjustments to the sustainability plans.

vi. Policy Review: The findings of this study can contribute to policy review and development at the local, regional, and national levels. It is recommended to engage policymakers and relevant authorities to review existing policies related to resource management in public primary schools and consider incorporating the best practices identified in this study. This can help to ensure that adequate policies and guidelines are in place to support sustainable resource management practices in educational settings

Declaration of Conflicting Interests and Ethics

The authors declare no conflict of interest.

Research limitations/implications

The study was conducted within one Sub-county and thus the results may not give a generalization of public primary schools in Kenya because some public schools are located in urban set up while others are in remote areas.

Originality/value

The results elicit an empirical platform for developing a framework and schedules for the care, handling, and maintenance of teaching and learning resources meant for agriculture.

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