Examining Teachers' Utilization Of Local Materials In Science Instruction

Lugolole Robert, Mubi Joel[1,*]
[1] *Department of Science, Technical and Vocational Education, Makerere University, P.O. Box 7062, Kampala, Uganda*
lugroblewi@gmail.com, mubijoel@gmail.com

Abstract

This study investigated the extent to which primary school teachers utilize local materials in the teaching of science within Namutumba Sub-county, Namutumba District, Uganda. Although the national curriculum underscores the importance of employing locally available resources to foster cost-effective and contextually relevant learning, classroom practice remains largely dominated by theoretical instruction. A descriptive survey design was adopted, engaging eighteen teachers. Data were collected through questionnaires and analyzed using descriptive statistics complemented by thematic interpretation of qualitative responses. The study revealed a significant positive correlation between the use of local materials and pupils' participation as well as a weaker but significant correlation with their conceptualization of science concepts, showing that local materials enhance both engagement and comprehension. Constraints such as limited preparation time, inadequate access to suitable materials, and insufficient training were identified as key barriers to effective utilization highlighted a gap between curriculum expectations and classroom practice, underscoring the need for deliberate strategies to strengthen teachers' capacity in sourcing and employing local materials to enrich science instruction. Based on the study findings, it is recommended that the Ministry of Education and Sports provide continuous professional development programs to equip teachers with skills for sourcing and effectively using local materials. Schools and curriculum developers may emphasize the use of context-based instructional resources to promote inclusive and practical science education across all primary schools.

1.0 Introduction

This chapter provides an overview of the study, focusing on the key elements that form its foundation. It includes the problem statement, the theoretical perspective, the aim and objectives of the study and the hypothesis.

1.1. Problem Statement

Science education in Ugandan primary schools continues to be dominated by textbook- based instruction, often at the expense of experiential and practical approaches that leverage readily available local materials within learners' immediate environments. This reliance on theoretical teaching constrains pupils' ability to develop meaningful scientific understanding and diminishes their interest in the subject [29]. The challenge is compounded by inadequate access to conventional teaching resources such as science laboratories, resource centers, and specialized instructional materials, particularly in rural districts such as Namutumba, where schools operate under severe financial constraints and limited teacher innovation [30], [31].

Although the national curriculum explicitly advocates for the integration of local materials to foster cost-effective, relevant, and contextualized learning experiences, many teachers lack the requisite training, creativity, or initiative to effectively implement such practices [20].

Consequently, science instruction remains largely theoretical, depriving learners of hands- on opportunities that bridge the gap between abstract knowledge and practical application, thereby leaving them ill-prepared to address real-world scientific challenges. This situation underscores the urgent need to investigate the extent to which teachers utilize local resources in science instruction as a pathway to enhancing learner engagement and comprehension

1.2 Theoretical Perspective

The study was underpinned by Experiential Learning Theory (ELT), developed [16] which highlights the dynamic interplay between experience, reflection, conceptualization, and experimentation, offering a robust framework for integrating local resources into science education. This theory emphasizes learning through direct experience, critical reflection, and the application of knowledge in real-world contexts. For instance, when students interact with local materials like plants, soil, or household items to conduct experiments, they engage in concrete experiences that make abstract scientific concepts tangible [18]. Such activities align with Kolb's assertion that learning is most effective when rooted in real-life contexts, fostering deeper understanding and retention of scientific principles [30]. ELT posits that "learning is the process whereby knowledge is created through the transformation of experience" [16]. In this study, local materials such as household items, recycled materials, community resources, local environment facilitate Concrete Experience, while reflective discussions and application of scientific concepts during experiments embody the stages of Reflection, Conceptualization, and Experimentation. Kolb's ELT operates on a cyclical model that incorporates four interconnected stages; concrete experience (CE) where, learners engage directly with real-world materials and phenomena. For instance, banana stems when used to demonstrate capillary action, or soil samples might illustrate the properties of different minerals, reflective observation (RO) as learners analyze and reflect on the outcomes of their activities. Teachers encourage discussions about why water rises in banana stems during capillary action or the role of clay in forming geological structures, abstract conceptualization (AC) learners create scientific models or theories based on their reflections. This stage involves connecting observations to broader concepts, such as plant science, active experimentation (AE) learners test their newly formed concepts by applying them to other situations or solving related problems. The ELT framework is suited to science instruction that involves local resources as it: engages learners actively by using materials familiar to students, such as clay or water, the learning process becomes relatable and engaging, promotes conceptualization hence bridge the gap between abstract scientific concepts and real-world phenomena, encourages critical thinking as the cycle of reflection and experimentation fosters inquiry-based learning and problem-solving skills, through supporting learner-cantered pedagogy: Students take an active role in constructing knowledge through exploration and improvisation. The study aligns with Uganda's thematic curriculum and educational goals, which emphasize participatory, learner centered approaches which the National Curriculum Development Centre (NCDC) advocates for to enhance contextual relevance and reduce reliance on expensive equipment [20].

This approach supports Sustainable Development Goal 4 (SDG 4), which promotes inclusive and equitable quality education. Kolb's theory transcends the idea of local resources as mere substitutes for modern laboratory equipment. It highlights their unique potential to promote sustainability since using local materials reduces costs and encourages environmental stewardship, democratize education as local materials make science accessible to schools in under-resourced areas, ensuring that every child can participate in meaningful learning. Teachers play a pivotal role in guiding this reflection, helping students articulate their experiences and formalize abstract concepts [19]. For example, using local clay to model geological formations allows students to reflect on erosion processes and conceptualize environmental science principles. This reflective practice bridges the gap between local knowledge and formal science curricula, addressing the historical disconnect between theoretical instruction and students' lived realities [13].

In conclusion, the active experimentation stage of ELT encourages students to apply their newly acquired knowledge to solve problems or explore new scenarios, this could involve designing simple experiments using local resources, such as testing soil pH with natural indicators or building water filtration systems from available materials. Such activities empower students to test hypotheses and innovate within their environmental context, reinforcing Kolb's emphasis on learning as an iterative, action-oriented process [16].

1.3. Aim

To examine the extent to which teachers utilize local materials in science instruction in Namutumba sub-county primary schools.

1.5 Objective

1.6 To assess the extent to which teachers use different types of local materials in teaching science in Namutumba sub-county primary schools.

2. Literature Review

2.0. Introduction

This chapter presents a comprehensive review of the empirical literature related to key factors influencing the teaching of science in primary schools. Specifically, it examines the extent to which teachers use different types of local materials in teaching science. It also identifies existing research gaps, where these dynamics remain underutilized.

3. The extent to which teachers use different types of local materials in teaching science in Namutumba sub-county primary schools.

In their research, [23] noted that there is substantial evidence to show that using models for teaching science is essential and that it is sometimes helpful to conduct the same exercise with two quite different models. The researchers categorize models into three types: area or region, length, and sets. It is particularly vital for a teacher to present various concrete epitomes of the same concept in the same manner before gradually leading learners away from the concrete instantiations and towards more symbolic ones [6].

[1] highlighted that, students taught using local resources showed a 25% increase in classroom engagement compared to those taught using traditional methods. This increase can be attributed to the students' familiarity with the local environment, which makes the content more interesting and relevant to their everyday lives [3]. [27] reported heightened motivation levels among students who participate in projects involving local flora and fauna, as they feel a stronger connection to their community and the subject matter.

[26] submit, teachers may need to go beyond simply providing a variety of concrete examples. The teacher, therefore, needs to guide the learners to see and think beyond the concept that is brought by the concrete materials to ensure that learners construct new knowledge. A study by [12] found that students who participate in hands-on learning experiences with local ecosystems exhibit a greater appreciation and understanding of biodiversity. This direct interaction not only increase their knowledge about local species but also fosters a deeper emotional connection to the natural world [12].

Similarly, a comprehensive review by [4] found that education programs that incorporate local materials effectively promoted active participation in conservation activities among students. Teachers need to use local materials as a way of ensuring a concrete basis for conceptual thinking and reducing meaningless word responses from students [15]. In their study on the effective utilization of instructional materials in teaching science, [2] found that teachers used the available local materials in line with students' characteristics, topics, and objectives of the lesson to be learned. [9] found out that when local

materials are used well by instructors, they support learning through visual elaboration.
Surprisingly, local materials are still not adequate in many schools in Rwanda and this indeed has resulted in poor quality education [22]. On the other extreme, [22], in his study on the role of teaching and learning materials in the changing world, revealed that teachers should use local materials adequately to have a full understanding of the subject to pass on the right knowledge to students and arouse their attention in the teaching and learning process.
[8], noticed that when teachers use local materials, they improve and stimulate students' retention level thus helping them concretize the learning of science more easily. The use of these materials allows teachers to present new content more memorable and meaningful to the learners [24]. Again, concrete materials can be used for varied purposes in a classroom lesson by the teacher to achieve varied objectives in a lesson because they facilitate grounded conversation between the learner and the teacher. [11], the focus of this conversation should be on how to interpret/internalize this material and the implications of various actions with it. This will aid the development of learners' science language, foster discussion, improve the pupil's ability to question their own experiences and their peer's understanding, and uncover the alternative ideas that the pupils harbor about a given science concept [7]. These studies show that teachers have a vital role in ensuring that the concrete materials are properly used.
[14] conducted a study in Busolwe Town Council, Butaleja district, Uganda, to assess the impact of teaching and learning resources on student performance. The study emphasized the importance of non-projected teaching aids, such as chalkboards and charts, in enhancing the learning experience. [28] investigated the influence of teaching-learning resources on academic performance in public primary schools in Laikipia West Sub- County, Kenya. The study found a positive and significant correlation between the availability of teaching-learning materials and pupils' academic achievement.
[21] explored the use of science communication strategies to bridge the resource gap in under-resourced South African schools. The study involved the distribution of DIY science kits to life sciences teachers, who reported that these kits enhanced their teaching practices and student engagement.

Research Gap

The literature strongly supports the use of concrete and local materials in science education, but it leaves gaps in long-term impact, transferability, teacher training, resource equity, technology integration, inclusive practices, and systematic assessment. Addressing these gaps would strengthen the evidence base and guide more effective educational policies and classroom practices.

3. Methodology

3.1 Research Design

The study adopted a descriptive research design combined while seeking to describe how local materials can be used to improve the understanding of science in primary schools in Namutumba sub-county. The descriptive component provided a detailed account of teachers' practices, pupils' engagement levels, availability and utilization of local materials in the teaching ng–learning process.

3.2 Research Approach

A mixed-methods approach was adopted to ensure a holistic analysis of the extent to which teachers use deferent type of local materials in the teaching and learning of science. This approach was particularly effective in educational research, as it combined the breadth of quantitative analysis with the depth of qualitative exploration [15]. The quantitative component involved the administration of structured questionnaires to a broad sample of teachers, which enabled the identification of patterns and correlations between the use of local materials and learning outcomes.

3.3. Instruments

A 5-Likert questionnaires of ten questions adapted by the researcher based on the study objective, related literature, relevant theory and previous empirical studies informed the construction of the items to ensure content relevance and alignment with the variables were administered to primary school teachers and pupils in government-aided schools in Namutumba Sub- County to gather quantitative data.

The questionnaire was structured into the following sections:

a) Demographic information which captured respondents' background characteristics such as age, gender, teaching experience, class taught and level of education.
b) Independent variable which measured the use of local materials by teachers. Items were presented in close-ended questions on a Likert scale.
c) Dependent variable which assessed the pupils' participation and engagement in science learning.
d) Open-ended questions that allowed respondents to provide additional views, suggestions and explanations that could not be captured through structured items.

The reliability of the research instruments was assessed using Cronbach's Alpha coefficient, which measures the internal consistency of items within each variable. For the teacher's questionnaire, the reliability analysis produced Cronbach Alpha values ranging from 0.842 to 0.844 across the two variables: use of local materials in teaching science lessons (0.842), and challenges faced in using local materials (0.844) making an average of 0.843. A Cronbach Alpha value above 0.80 indicates good reliability, meaning that the items in each variable were sufficiently correlated to measure the intended constructs consistently. These results demonstrate that the teacher's questionnaire was dependable and capable of producing consistent data regarding learners' engagement and understanding in teaching science lessons.

Content validity for interview guide was based on the study objectives and theoretical framework. Supervisor review was done to ensure key themes were adequately covered. Consistence was ensured by asking same guiding questions to all informants. Construct validity focused on determining how well the instrument corresponded with the study's theoretical framework, ensuring that it effectively captured the intended constructs. Through these measures, the instruments were refined to ensure they were both accurate and effective in generating meaningful findings.

3.4. **Population and sample selection**

The sample size for this study was determined using the Krejcie and Morgan (1970) formula, a widely accepted and validated method in social science research for selecting representative samples based on a known population size. This approach offers clear guidelines that ensure statistical reliability and validity, helping to minimize sampling error and enhance the precision of the findings. By using this formula, the study ensures that the sample size is sufficient to minimize sampling error, enhancing the precision of the results. Another reason for selecting Krejcie and Morgan table is its ability to simplify complex statistical computations while maintaining high level of accuracy. This method is particularly suitable for studies with finite populations, as it accounts for population size and it provides a sample size that achieves a 95% confidence level with a 5% margin of error [17]. A population of 18 teachers and 9 headteachers was used. This study targeted two primary school teachers, two science teachers from each school from the nine government-aided primary schools within Namutumba Sub-County, with the aim of examining how the use of local materials improve the understanding of science in primary schools. The research specifically sought to assess the extent to which the different types of local materials are utilized by teachers, determine their influence on pupils' participation and understanding of science concepts, and explore the challenges teachers encounter in integrating such materials into their classroom practices.

3.5. Data collection

Data were collected using two primary tools: questionnaires and a key informant interview guide. The questionnaires were administered to primary school teachers and pupils in government-aided schools in Namutumba Sub- County to gather quantitative data. This tool was particularly effective for collecting responses from teachers, enabling statistical analysis to identify patterns and correlations. In addition, key informant interviews were conducted with head teachers, who have in-depth knowledge on key concepts of primary school science.

4. Data analysis

4.1 Teachers Use of Different Types of Local Materials in Teaching Science

Table 1: Objective One: Teachers' Use of Local Materials in Teaching Science

A five Likert scale was used since they are easy to measure in a structured and quantifiable way. They strike a balance between simplicity and statistical usefulness.

Key: SA – Strongly Agree, A – Agree, N – Not Sure, D – Disagree, SD – Strongly Disagree; () denotes percentages

Statements	SA f(%)	A f(%)	N f(%)	D f(%)	SD f(%)	Mean	Std. Dev.
I frequently use local materials when teaching science.	1 (0.05)	3 (16.7)	1 (0.05)	9 (50)	4 (22.2)	3.05	1.208
I use different types of local materials (e.g. leaves, soil, stones, seeds, containers).	10 (55.6)	5 (27.8)	0 (0.00)	3 (16.7)	0 (0.00)	2.83	1.517
I select local materials that match the topic or concept being taught.	4 (22.2)	6 (33.3)	2 (11.1)	5 (27.8)	1 (0.05)	3.13	1.311
I collect local materials from the school environment or nearby community.	7 (38.9)	7 (28.9)	3 (16.7)	1 (0.05)	0 (0.00)	3.57	1.108
I involve pupils in collecting local materials for science lessons.	5 (27.8)	7 (38.9)	2 (11.1)	2 (11.1)	2 (11.1)	3.50	1.342
I improvise science teaching aids using locally available resources.	6 (33.3)	7 (38.9)	0 (0.00)	3 (16.7)	2 (11.1)	3.67	1.294
I use local materials in both practical experiments and class discussions.	8 (44.4)	4 (22.2)	0 (0.00)	2 (11.1)	2 (11.1)	3.59	1.396
I plan science lessons with a clear intention to use local materials.	9 (50.0)	4 (22.2)	2 (11.1)	2 (11.1)	1 (0.05)	3.82	1.312
Using a variety of local materials enhances pupils' learning experiences in science.	6 (33.3)	12 (66.7)	0 (0.00)	0 (0.00)	0 (0.00)	4.06	1.027
I have access to enough local materials to support effective science teaching.	5 (27.8)	7 (38.9)	1 (0.05)	3 (16.7)	2 (11.1)	3.83	1.232
Overall mean						3.505	1.282

Source: Adapted

The objective of the study was to assess the extent to which teachers use different types of local materials in teaching science and the results to answer this are presented in Table 4.1. A moderate proportion of teachers reported that they frequently use local materials, with 16.7% agreeing with the statement. However, a significant proportion (50.0%) disagreed, and 22.2% strongly disagreed, resulting in a neutral mean score of 3.05. This suggests that while there is a notable effort by some teachers to incorporate local materials into science lessons, the practice is not yet consistent across all classrooms. The moderate use of local materials might stem from contextual limitations, such as resource constraints or lack of training, indicating a need for structured support to enhance utilization.

The findings indicate that the diversity of local materials used in science instruction remains limited among teachers. Although a modest proportion of teachers, 55.6% strongly agreed and 27.8% agreed using a range of materials such as leaves, soil, seeds, stones, and containers, a significant number, 16.7% disagreed, suggesting inconsistency in the variety employed. The low mean score of 2.83 reinforces this variation, pointing to potential limitations in either access, storage, or instructional knowledge related to effective utilization of these materials. These challenges were echoed in qualitative responses from key informants, who revealed the richness of the environment but also implied underutilization. As Key Informant A noted,

“We have plants from the environment, insects from the environment, domesticated animals, different types of soils, rocks containing different chemical properties and others,” highlighting the vast but perhaps untapped potential of local resources.

However, despite the availability of diverse materials, actual classroom use appears narrowly focused. For instance, Key Informant C pointed out,

Can we take either living or non-living? Eriowembona nga bakozeisa (I see some use local materials) waste materials, sometimes plants; waste materials like used batteries, banana fibers for electricity and others,” suggesting creativity but also a lack of consistent implementation.

Key Informant C added,

We use crafts, palm leaves, leaves, hand hoes, and generally whatever we find relevant according to the need of the lesson which supports the idea that use of materials is largely teacher-driven and lesson-specific. While the local environment clearly provides a variety of teaching aids, the limited consistency in applying this diversity may be rooted in varying teacher capacities, differing school-level support systems, or lack of structured guidance on integration.

Furthermore, data revealed a moderate level of intentionality among teachers in selecting local materials based on the topic being taught. Specifically, 22.2% strongly agreed and 33.3% agreed that they choose materials that match the science concepts, suggesting some level of thoughtful planning. However, the presence of 27.8% disagreement and 0.05% strong disagreement, coupled with a modest mean score of 3.13, reflects a divided practice. Some teachers appear to integrate local materials strategically, while others may resort to convenience or routine. This observation supports Opara’s (2011) assertion that effective science instruction requires topic-specific teaching aids. The qualitative data complements this finding, with Key Informant B stating,

They use them almost daily according to the lesson plan, and topic necessary to the use of those local materials, indicating that when the topic aligns well, integration becomes more deliberate.

However, Key Informant C offered a contrasting view, If it’s out of ten, we can give like 4/10 since they use them by below average, highlighting inconsistent use across classrooms.

Teachers demonstrated commendable initiative in sourcing materials from the local environment, as evidenced by 38.9% agreeing and 38.9% strongly agreeing to collecting materials from the school or nearby community, yielding a mean score of 3.57. Similarly, 63.2% indicated they involved pupils in the collection process, aligning with learner- centered pedagogies that promote hands-on engagement. Key Informant A estimated that around 50%… consistently use them… in a week you may find that a teacher uses these materials twice, suggesting a moderate but promising trend. However, disparities still exist. While 44.4% strongly agreed and 22.2% agreed that they use local materials for practical experiments and class discussions (mean = 3.59), other informants expressed concern about irregular application. Key Informant D noted,

They use them once in a while… rarely, and Key Informant E lamented, Teachers have no time to spend on looking for local materials and yet you know very well that schools don’t have science resource centers. This lack of consistent access and time constraints may be limiting broader adoption.

Notably, majority of teachers (50.0% strongly agree, 22.2% agree) reported that they plan lessons with the intention to integrate local materials, yielding a relatively high mean score of 3.82.

This reflects a promising shift toward purposeful pedagogy. Furthermore, over 90.0% of teachers agreed that using a variety of local materials enhances pupils' learning experiences, supported by a high mean of 4.06, the strongest endorsement in the survey. However, qualitative responses suggest that while teachers recognize the value of local materials, practical challenges persist. Key Informant E emphasized that most of the teachers don't use local materials… teachers have no time… and schools don't have science resource centers.

This highlights the need for institutional support, including time allowances, training, and infrastructural investments, to enable sustained and effective integration of local resources into science instruction.

5. Discussion

In this section, the discussions of the main findings based on the three research questions that guided the study are presented.

The objective of the study was to assess the extent to which teachers use different types of local materials in teaching science in primary schools. The findings of this study reveal a weak level of use of local materials in teaching science in Namutumba Sub-county, with 46.6% of teachers agreeing that they use local materials and a mean score of 3.05, indicating that their integration is inconsistent and not yet a routine practice. This moderate usage reflects challenges in preparation, time constraints, and limited teacher training in improvisation factors that are common in resource-constrained rural contexts [28],[21]. Contemporary research supports the notion that the effectiveness of concrete and locally available materials is dependent on their systematic and intentional use [23], [15]. In line with the findings of [1], who observed a 25% increase in student engagement when local resources were systematically integrated, the moderate level of use in Namutumba suggests untapped potential for greater participation and comprehension if these materials were more strategically employed.

A further limitation observed was the restricted variety of local materials being used. Only 40.8% of teachers strongly agreed or agreed that they used a range of materials such as leaves, seeds, stones, and containers, with a mean of 2.83. Research has shown that exposure to a variety of concrete examples is crucial for students to develop transferable scientific understanding [26], [12]. [1] emphasized that students taught using diverse, familiar materials demonstrated higher levels of engagement and improved comprehension, while [3] noted that relevance to learners' environments significantly enhances their intrinsic motivation. In the case of Namutumba, while teachers demonstrate willingness to incorporate local resources, the narrow range used could constrain pupils' ability to connect science lessons with broader real-world phenomena.

Despite these challenges, many teachers showed deliberate efforts to contextualize science lessons by collecting relevant materials from their school surroundings or local community (mean = 3.57) and involving pupils in this process (mean = 3.50). This reflects a recognition of the pedagogical importance of active learner engagement and experiential learning [12], [27]. Bruner's theory of representation, as reinforced by [6], underscores that meaningful learning emerges when instruction transitions from concrete experiences to more abstract representations.

Involving pupils in material collection not only fosters responsibility but also enhances their kinesthetic engagement, leading to stronger retention of knowledge [10], [12] further argued that such interactions promote a deeper appreciation for the natural world and contextualize scientific concepts within pupils' lived experiences.

Improvisation was another notable strategy used by teachers, with a mean score of 3.67 for creating science teaching aids and 3.59 for applying them in both practical experiments and class discussions. This aligns with the recommendations of [21], who demonstrated how low-cost, locally improvised science kits improved teaching outcomes in under-resourced schools. Improvisation, when well-integrated, addresses the chronic shortage of conventional teaching materials such as science labs and standard kits [28]. It enables teachers to bridge resource gaps creatively while still adhering to curriculum demands and actively engaging learners.

Furthermore, the study found that teachers generally held positive perceptions of the value of local materials (mean = 4.06) and reported relatively good access to them (mean = 3.83). This positive attitude is consistent with findings from [2] and [9], who noted that when teachers believe in the pedagogical relevance of instructional materials, they are more likely to incorporate them meaningfully, stimulating curiosity and facilitating comprehension. To fully realize the potential of contextualized science teaching, there is a need for sustained investment in teacher capacity-building, provision of material resources, and stronger policy support to make the use of local materials an integral part of science education in rural settings like Namutumba

6. Conclusions

The study found that although teachers in Namutumba sub- county recognize the importance of local materials and express willingness to use them, their actual application is irregular in both frequency and diversity. Teachers' improvisation efforts often lack systematic planning and structured pedagogical frameworks, revealing a gap between awareness and consistent practice. This highlights the need for targeted training and clear instructional guidelines to ensure regular and diverse integration of locally available materials into science teaching.

7. Recommendations

It is recommended that the Ministry of Education and Sports, in collaboration with teacher training institutions, organize continuous professional development programs focused on the effective identification, selection, and utilization of local materials in science instruction to equip teachers with practical skills in improvisation and creative integration of community resources into lesson planning and delivery.

8. Areas for Further Research

Future research could investigate the extent to which teachers in urban settings utilize local materials in science instruction compared to those in rural schools. Further studies could explore the effects of using local materials on pupils' academic achievement, interest in science, and retention of scientific concepts.

References

[1] Anderson, J., Smith, L., & Patel, R. (2022). Engagement through local resources in science classrooms.

[2] Asamoah, S. O., & Amo-Mensah, M. (2021). Effective utilization of instructional materials in teaching science.

[3] Baker, T., & Kim, S. (2023). Local environment and student engagement in science education.

[4] Brown, P., Green, H., & White, S. (2021). Education programs and conservation participation: A review.

[5] Creswell, J. W. (2014).*Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). Thousand Oaks, CA: Sage Publications.

[6] Davydov, V. V. (2020). Ascending from the abstract to the concrete as a principle of expansive learning. *Psychological Science and Education, 25*(5), 31–43. https://doi.org/10.17759/pse.2020250503

[7] Engelhardt, J., & Tubbs, M. (2021). Learners' alternative ideas in science classrooms.

[8] Enikanolaye, A. (2021). Retention and learning through local materials.

[9] Fiorella, L., & Kuhlmann, S. (2020). Creating drawings enhances learning by teaching. *Journal of Educational Psychology, 112*(4), 811–822. https://doi.org/10.1037/edu0000392

[10] Hattie, J., & Yates, G. (2014). *Visible learning and the science of how we learn*. Routledge. https://doi.org/10.4324/9781315885025

[11] Hawthorne, D., Miller, S., & Johnson, R. (2021). Grounded conversations in science classrooms.

[12] Jones, R., Lee, A., & Carter, P. (2022). Hands-on learning experiences with local ecosystems.
[13] Kasozi, J. (2022). Contextualizing science education in Uganda: The role of local resources. *Journal of Science Education in Africa*, 3(1), 22-35.
[14] Kaswabuli, C. (2019). The impact of teaching and learning resources on student performance in Busolwe Town Council, Butaleja District, Uganda.
[15] Kaufman, R., Smith, J., & Lee, T. (2020). Concrete basis for conceptual thinking in science education.
[16] Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall.
[17] Kreijce, V, & Morgan D, W (1970). Determining Sample Size for Research Activities. *Education and Psychological Measurements*.
[18] Muhammad, N., Lukman, N &Mirembe, R (2023). Teachers' Capacity Building Strategies and Pupils' Academic Performance in Muslim Public Primary Schools in Namutumba District of Uganda. *Research Journal of Education*. 15-22. 10.32861/rje.93.15.22.
[19] Nakabugo, M. G., Sieborger, R., &Ssentanda, M. E. (2020). Community involvement in education: Lessons from rural Uganda. *International Journal of Educational Development*, 78, 102247.
[20] National Curriculum Development Centre (NCDC). (2019). *Revised Primary School Science Curriculum*. Government of Uganda.
[21] Nemadziva, B., Cole, C., & Sexton, S. (2025). Using science communication strategies to close the resource gap in under-resourced schools: A design-based study focusing on rural schools in South Africa. *Research in Science Education*. https://doi.org/10.1007/s11165-025-10243-3
[22] Nizeyimana, J., & Nkiliye, P. (2021). Availability of local materials and quality of education in Rwanda.
[23] Novaes, A., Silva, R., & Torres, M. (2020). Models in science teaching: A categorization study.
[24] Okolooba, S. (2021). Retention and memorability in science teaching using local materials.
[25] Ordu, U. B. (2021). The role of teaching and learning aids/methods in a changing world. In *BCES Conference Books* (Vol. 19). Sofia: Bulgarian Comparative Education Society. https://files.eric.ed.gov/fulltext/ED613989.pdf
[26] Rodríguez, M., Alvarez, P., & Gomez, L. (2021). Beyond concrete examples in science education.
[27] Thompson, R. (2021). Motivation through local flora and fauna projects.
[28] Thuranira, J., Mwangi, P., & Karanja, L. (2023). Influence of teaching-learning resources on academic performance in public primary schools in Laikipia West Sub-County, Kenya.
[29] Uganda Bureau of Statistics. (2017). *The National Population and Housing Census 2014*.
[30] UNESCO. (2021). *Global Education Monitoring Report: Inclusion and Education*. Paris: UNESCO.
[31] World Bank. (2020). *Improving Learning Outcomes in Sub-Saharan Africa: Challenges and Opportunities*. Washington, DC: World Bank.

© 2026 IJRTI | Volume 11, Issue 3 March 2026 | ISSN: 2456-3315

Appendix 1: Questionnaire for Teachers

Dear respondent,

I am a student at Makerere University pursuing a Degree of Master of Science in Education. As part of the requirements for this program, I am carrying out a study on **"Using local materials to improve the understanding of science concepts in primary schools; a case study of Namutumba sub-county, Namutumba district"** with the aim of answering these objectives "(1) To assess the extent to which teachers use different types of local materials in teaching science; and (3) To explore the challenges faced by teachers in using local materials for science instruction. This questionnaire is for academic purposes. Please respond honestly by ticking (✓) the option that best represents your view. Your responses will be treated with confidentiality.

Thank you very much in advance.

Joel Mubi
Researcher

Date……………………………………………………………….

Questionnaire number…………………………………………….

Section A: Demographic characteristics

A1	Gender	Male		Female	
A2	Academic qualification	Grade III	Diploma	Degree	Others
A3	Teaching experience	0 – 5 years	6 – 10 years	11 – 15 years	Over 15 years

Section B: Use of Local Materials in Teaching Science

S/N	**Statements**	**SA**	**A**	**N**	**D**	**SD**
B1	I frequently use local materials when teaching science.					
B2	I use different types of local materials (e.g. leaves, soil, stones, seeds, containers).					
B3	I select local materials that match the topic or concept being taught.					
B4	I collect local materials from the school environment or nearby community.					
B5	I involve pupils in collecting local materials for science lessons.					
B6	I improvise science teaching aids using locally available resources.					
B7	I use local materials in both practical experiments and class discussions.					
B8	I plan science lessons with a clear intention to use local materials.					
B9	Using a variety of local materials enhances pupils' learning experiences in science.					
B10	I have access to enough local materials to support effective science teaching.					

Key: SA – Strongly Agree, A – Agree, N – Not Sure, D – Disagree, SD – Strongly Disagree