

THE USE OF IMPROVISED RESOURCES IN SCIENCE CLASSROOMS IN SOUTH AFRICAN TOWNSHIP SCHOOLS

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Abstract

A considerable number of schools in South Africa are under-resourced and this dilemma poses formidable instructional challenges which stifle teachers' ability to foster meaningful teaching and learning in science classrooms. There is a critical need to circumvent general lack of resources in township schools by harnessing pedagogical affordances of improvised resources. In response to this key strategic imperative, the study examined the use of improvised resources in science classrooms in South African township schools. The study adopted a generic qualitative design and involved purposively selected science teachers from South African township schools as participants. Qualitative data was collected through semi-structured interviews and classroom observations. Key findings demonstrated that the use of improvised resources is central to coherent development of scientific literacy and sustainable inculcation of requisite scientific skills in science classrooms. Theoretical implications for pedagogic innovation are discussed.

Keywords: *Improvised resources, affordances, scientific literacy, pedagogic innovation.*

1. Introduction

A substantial number of schools in South Africa are under-resourced. There is a need for teachers to use improvised resources to circumvent general lack of resources in schools. According to Parker *et al* (2018), improvised instructional resources are local materials used in the absence of the real or original materials to bring about the same learning effect that the real equipment can bring about. Improvised instructional materials may include plants, soil or rocks, written or printed materials such as charts and magazines. The utilization of improvised resources can be harnessed to maximize the academic experience of learners in science classrooms (Adamu, 2020). According to Benson (2019), learners are able to learn through associative mechanism using multisensory modalities when teachers conduct lessons using different improvised resources. There is a need to explore the use of improvised resources particularly in under-resourced schools where opportunities for practical work are limited.

2. Background

Improvisation demands creativity, adventure, and curiosity on the part of the teacher (Mensah, 2015). Ntladi and Ramaila (2020) point out that teachers lack appropriate professional skills to use improvised resources in schools in a meaningful way. Teachers prefer to use original standardized materials in schools as opposed to improvised resources (Mensah, 2015). Many science teachers are not able to improvise science education equipment due to lack of skills (Akuna & Callaghan, 2016). In support of this assertion, Okori and Jerry (2017) maintain that many teachers cannot improvise biology equipment due to lack of creativity and resourcefulness. Lack of adequate professional development is a major factor militating against the effective use of local resources in science teaching (Okori & Jerry, 2017). The prevailing situation is exacerbated by general lack of teaching and learning resources in schools (Sedibe, 2011). Availability of adequate resources is central to the provision of quality education. Poor learner performance can be attributed to inadequate learning facilities (Oladejo *et.al*, 2011). Appropriate strategic interventions that encourage teachers to embrace pedagogic innovation ought to put in place. Such interventions can be harnessed to develop teacher professional capacity required for meaningful utilization of improvised resources in science classrooms.

3. Purpose of the study

The study examined the use of improvised resources in science classrooms in South African township schools. The empirical investigation was underpinned by the following concomitant objectives.

- To explore science teachers' perceptions about the use of improvised resources in teaching and learning.
- To identify pedagogical practices adopted by science teachers when using improvised resources in teaching and learning

4. Research design and methodology

The study adopted a generic qualitative design and involved six purposively selected science teachers as participants. According to McMillan and Schumacher (2010), a qualitative study is meant to be descriptive and interpretive by its very nature. Qualitative data was collected through semi-structured interviews and classroom observations. Qualitative data was thematically analysed.

5. Research findings

Table 1 below provides the demographic profile of the participants.

Table 1. Demographic profile of the participants.

Teacher	Gender	Teaching Experience	Qualification	Knowledge Area
A	Male	18 years	BSc	Physical Sciences
B	Female	4 years	Bed	Life Sciences
C	Male	6 years	Bed	Physical sciences
D	Female	5 years	HDE	Natural Sciences
E	Male	5 years	HDE	Life sciences
F	Female	8 years	Bed	Natural Sciences

Key findings emanating from the study were clustered according to the themes that emerged during data analysis, namely: science teachers' perceptions about the use of improvised resources in teaching and learning, pedagogical practices adopted by science teachers when using improvised resources in science classrooms and teacher professional development needs on the use of improvised resources.

5.1. Theme 1: Science teachers' perceptions about the use of improvised resources in teaching and learning

The teachers indicated that the use of improvised resources promotes active learner engagement. In addition, the use of improvised resources enables teachers to employ interactive activities which provide opportunities for learners to collaborate as the following excerpt demonstrates.

When using improvised resources, learners are actively involved in the learning activities. Learners are eager to learn from each other and exhibit high motivation levels.

The use of improvised resources was perceived to improve learner academic performance. This perception is captured in the following excerpt.

Availability of different resources positively influences how learners perform. Learners are able to learn by seeing what you are talking about and they will never forget. Availability of multiple resources accommodates different learning styles and helps learners with learning difficulties.

The teachers pointed out that they are compelled to use improvised resources in science classrooms due to general lack of resources in schools as the following excerpt illustrates.

As you can see the laboratory is empty, people broke in and stole everything, it has been years now. The Science Centre helps us a lot but they do not come all the time when we need to do experiments so sometimes we just read the instructions and the results so that learners can answer questions.

5.2. Theme 2: Pedagogical practices adopted by science teachers when using improvised resources in science classrooms

The teachers adopted various pedagogical strategies when using improvised resources in science classrooms. These pedagogical strategies include cooperative learning, concept mapping, self-directed learning, problem-based learning, inquiry-based learning and project-based learning.

When using improvised resources, I divide the learners into small groups to work on projects. Learners are also given opportunities to learn at their own pace and to investigate scientific phenomena independently.

5.3. Theme 3: Teacher professional development needs on the use of improvised resources

While the teachers expressed fundamental appreciation of the pedagogical affordances of improvised resources, they bemoaned lack of professional development in this regard. Meaningful and coherent integration of improvised resources in science teaching and learning requires professional capacity. These sentiments are encapsulated in the following excerpt.

I do not remember being taught about improvisation. I did BSc and not Bed maybe that is why. Professional development opportunities on the use of improvised resources must be provided on an ongoing basis.

6. Discussion

The use of improvised resources promotes active learner engagement and enables teachers to employ interactive activities which provide opportunities for learners to collaborate. In addition, the use of improvised resources was perceived to improve learner academic performance. This is consistent with a study conducted by Mboto *et al* (2011) which found that the academic performance of learners exposed to the use of improvised resources in science classrooms improves significantly. The teachers adopted various pedagogical strategies when using improvised resources in science classrooms. While the teachers expressed fundamental appreciation of the pedagogical affordances of improvised resources, they bemoaned lack of professional development in this regard. Lack of appropriate professional development on the integration of improvised resources stifles meaningful science teaching and learning (Ramathwala & Ramaila, 2020). According to Okori and Jerry (2017), lack of adequate professional training is a major factor militating against the effective use of improvised resources in science classrooms. The teachers pointed out that they are compelled to use improvised resources in science classrooms due to general lack of resources in schools.

7. Conclusion

The study demonstrated that sustainable and coherent utilization of improvised resources in science classrooms improves learner academic achievement. There is a need to put in place appropriate professional development interventions geared towards professional empowerment of teachers on the utilization on improvised resources to maximize the academic experience of learners.

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