Pedagogical Strategies for Teaching Sustainable Development in the Technology Curriculum: A Case in the South African Context.

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Abstract

The teaching of sustainable development locally, internationally, and globally has attracted interest. It is also considered as one of the most important concepts of the 21st century. The concept of sustainable development aims to align the nature of the three development factors, i.e., respecting the environment, social progress, and economic growth, pointing to the need to move away from the economic side to create value. In the European Union, socioeconomic development is now reflected in all development policies. However, in the South African curricula, policies, particularly the Curriculum Assessment Policy Statement (CAPS), seem to lack practical teaching of the concept despite its recognition worldwide. Some studies have shown a limited association between pedagogical approaches and how they can affect sustainability skills in some university courses. This article aims to present research results on pedagogical strategies for sustainable development in teaching Technology curriculum in secondary schools particularly Senior Phase. Hence, the research question was what pedagogical strategies Technology teachers can use to teach for sustainable development? Therefore, this research is in response to a call to put this concept into practice in all South African subjects and in particular Technology curriculum. A curriculum subject advisor and eight Technology teachers from Ehlanzeni district in Mpumalanga Province were purposefully selected as study participants. Observations and interviews were deemed appropriate for data collection for the study and content analysis was used for data analysis. Research results show that subject advisor and teachers are aware of the concept of sustainable development and have offered opportunities to teach this concept in the content of the Technology curriculum. However, the results show that the actual implementation is a difficult factor. As a result, the analyses performed have allowed me to present directions for the practical implementation of this concept in the Technology subject.

Keywords: *Technology curriculum, Technology Education, pedagogical strategies, sustainable development.*

1. Introduction

The concept sustainable development has been recognized throughout the world in various sectors including Higher Education Institutions (HEIs), education, research, operations, community outreach etc (Lozano, et al., 2017). Correspondingly, Grosseck, et al., (2019) writes the concept has gained momentum in research in recent years. Hence, the United Nations (UN) found an integral part of the Agenda 2030 essential i.e., 17 Sustainable Development Goals (SDGs), which describe the main development challenges for humanity. In the 17 SDGs number 4 is about quality education. It is from this view that education system is seen as a key factor in shifting the conventional development model, focused solely on economic growth, towards a sustainable society (Zwolińska, et al., 2022). Thence, education for sustainable development (ESD), is regarded as one of the most important tools to help bring about positive changes, in the face of the current environmental challenges (Zwolińska, et al., 2022). The European policy took the lead in having strategies for the implementation of sustainable development, similarly other countries such as USA, UK, China, Australia, and Canada had the same understanding with incorporation of sustainable development specifically the focus highlighted on health, education, management, energy, agriculture, and environmental issues (Hallinger & Chatpinyakoop, 2019). In that line, the South African curriculum appears to have limited information about Sustainable development integration in schools as more conducted research focus on higher education. Nonetheless, the Curriculum Assessment Policy Statements (CAPS) document particularly for Technology Education make some references to sustainable development aspects that

encourages values which takes into account the impact on the environment, social, natural, and economic [Department of Basic Education (DBE), 2011]. While that is the case teaching that makes reference to sustainable development appears to be a challenging factor in the Technology curriculum. Hence, this article aimed to provide directions to the practical implementation of sustainability teaching in Technology curriculum. The research question that guided this paper was: what pedagogical strategies Technology teachers can use to teach for sustainable development?

2. Research Methodology

Interviews and classroom observations were conducted with eight Technology teachers and a curriculum subject advisor at Ehlanzeni District in Mpumalanga Province, South Africa. Qualitative case studies were the focus on the sampling size in this paper and intended to explore a real-life phenomenon on the teaching of sustainable development in Technology curriculum. The rationale for purposive sampling of the teacher participants was that they were engaged in their teaching contexts so that the case in question could be understood from the multiple perspectives from which ESD can be taught. Individual semi-structured interviews were conducted at the participant's workplace which each took approximately 30-40 minutes, and classroom observations took an hour for each teacher. Within a constructivism paradigm, enabled for the use of content analysis to analyse data where two broad themes were identified through narrations related to the phenomena, transcriptions were broken down into small units and performed data analysis. The data from classroom observations were corroborated within the identified themes and, the transferred textual format as transcription was read several times (Vaismoradi & Snelgrove, 2019) for the achievement of the understanding of sustainability teaching in the Technology curriculum. All participants in this study consented their willingness for participation.

3. Results

From the results, it was observed that teachers had an understanding of the concept sustainable development. The teachers further highlighted on how the concept links to how African people lived sustainable and continue to do so. Schultz (2020) give highlights on the contributions indigenous people they can make to sustainability in the development of SGDs through their knowledge of sustainable practices, and their aspirations for development based on indigenous cultural norms and values.

3.1 Sustainable development within African people

It was observed that teachers when asked about the understanding they have on the concept sustainable development, responded, and indicated that sustainable development has do to with maintaining and using resources in way that the future generations will continue to have access to those resources. For instance, one teacher stated that: *"development of something that can be used in future something that is not just for once then do something that you will continue using and helping the community in a positive way".* Other teachers give the thinking that it has to do with effective use of resources in a way it won't cause harm to the environment. Thus: *"some of them is how we use the sun's energy to create solar power, or we use the wind energy to create electric turbines or even windmills, which is also is trying to save is cost effective for the economy".* Furthermore, the results showed that in relation to the subject Technology refers to any development in the subject that gives an aspect of sustainable development. "*So, we develop in such a way that if we use technology, technology can be also used in 20 years to come again. We develop now and stay for a long period of time".* Form this perspective teachers further showed that sustainability is the term that was used by our forefathers and continue to do so even today as some people still rely on the indigenous way of doing things with less harm. For example, some still have small gardens where they keep their green food and grind mealies for survival. *"The first farmers made use of pastoralism right and growing of crops. So, they relied on sustainable development for survival".*

3.2 Teaching opportunities for sustainable development in Technology curriculum

From the teacher's perspective the Technology curriculum provides opportunities for sustainable development teaching. Teachers provided Technology contents with the opportunity to teach towards sustainable development. Themes such as processing and recycling were the mentioned content areas that presents great opportunities for the teaching of sustainable development. From this view,

the results showed that the Technology curriculum response to the call for the teaching of sustainable development. In support of that the results showed that from an indigenous point of view lies an opportuning for sustainable development. *"I think that one I can utilize the human resource that we I can request, maybe an old person who knows how things were done before, then organize maybe a group of learners, that he can teach those learners in terms of how things were done before, for example, maybe in terms of cultivation, how old people used to cultivate, and now we have different mechanisms in terms of cultivation".* Notably, teachers indicated that recognition of learners' cultural context in their activities informs centralised teaching within the community of practice (CoP) and *Ubuntu* principles. Significantly, the curriculum subject advisor believed that collaboration learning can help to realise indigenous technology. As learners collaborate, respect one another, and interact with stakeholders, the approaches may aid in the realisation of the principles of *Ubuntu* and CoP. Nonetheless, the findings showed that based on classroom observational data, teachers did not own the opportunities that the subject Technology offers them to integrate indigenous technology. Consequently, learners' learning in an indigenous context was compromised. Additionally, despite claims made about the importance of the collaborative approach in promoting indigenous technology during interviews, teachers failed to use the approach while teaching. However, based on my observations, the demonstration and lecture methods had a strong foundation for the incorporation of indigenous technology to teach towards ESD. Drawing from the above, teaching of sustainability in Technology curriculum lies within indigenous teaching as the practical aspects of the subject open up for knowledges on environmental, social and economic aspects i.e., criteria for teaching and assessing design features: value for money, safety and ergonomics, environmental impact, bias towards or against a group etc. (DBE, 2011).

4. Conclusion

From the findings of the paper, it shows that there are opportunities for sustainable development in Technology curriculum, especially within an indigenous perspectives as cultural background is found to have roots to indigenous ways of life that relates to sustainable living. For instance, Nölting, et al., (2020) sustainability transfer plays a great role in sustainability recognition. It is seen as having great potential for development because solving sustainability problems requires cooperation between actors from very different sub-systems in society. It is then from this understanding that the study found technological resources that reflect on indigenous livings. This therefore provides practical directions to the implementation of the concept sustainability in the subject as it appears that teachers found it difficult to incorporate the concept in the contents of the subject despite them having knowledge about the concept and view on indigenous knowledge in sustainability.

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