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THE VIEWS OF TEACHERS TOWARDS INTEGRATING ETHNOBOTANY INTO ZIMBABWEAN SECONDARY SCHOOLS.

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I, **Manhari Rosemary Anesu (B241800A**), declare that this work is my own original work except where sources have been acknowledged, that it has not been plagiarized nor submitted for similar degree in any other University.

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Date November 2025

DEDICATION

I dedicate my dissertation work to the Almighty God, to my family and friends. A special feeling of gratitude goes to my parents, Jane Mangove and Manhari Shupikai C, my brothers George and Godknows Manhari, and my headmaster Mr Chinhoyi whose words of encouragement and diligence kept ringing in my ears. My fellow friends, Hazel Taimu, Lister Zhanje and Christine Nyadongo. I thank you for the support and encouragement.

To my parents you are a blessing to me, you are the best parents ever in the world, and I will forever love you.

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ABSTRACT

This study explores the perspectives of secondary school biology teachers in Zimbabwe regarding the integration of ethnobotany into the national curriculum. With an increasing recognition of the importance of Indigenous Knowledge Systems (IKS) in promoting culturally relevant and context-based education, this research investigates teachers' perceptions, perceived benefits, challenges, and strategies for effectively embedding ethnobotanical knowledge in classroom practice. Using a qualitative approach, data were collected through semi-structured interviews with 15 biology teachers from diverse educational settings in the Mbire District. Findings reveal that while teachers generally hold positive views on the integration of ethnobotany, recognizing its potential to enhance learner engagement and understanding, they face significant barriers including a lack of teaching resources, insufficient training, and rigid curriculum structures that prioritize Western scientific frameworks. The study identifies several key benefits associated with the inclusion of ethnobotany, such as improved student motivation, strengthened cultural identity, and increased environmental awareness. Teachers emphasized the need for clearer curricular guidelines, targeted professional development, and stronger community partnerships to facilitate meaningful integration. In conclusion, this research underscores the necessity for systemic support across policy, curriculum, and institutional levels to enable the successful incorporation of ethnobotany into Zimbabwean secondary education. The findings contribute to ongoing efforts to enhance culturally responsive teaching in the context of sustainable development and the revitalization of Indigenous knowledge.

Key words: Ethnobotany, Indigenous Knowledge Systems, secondary schools, curriculum and teachers

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CHAPTER 1

1.0. Introduction

Education systems worldwide are increasingly recognizing the importance of integrating indigenous knowledge systems (IKS) into formal curricula to promote culturally relevant and context-based learning. In Zimbabwe, ethnobotany, the study of the relationships between people and plants within cultural contexts represents a significant component of indigenous knowledge that has traditionally shaped local practices in medicine, agriculture, food security, and environmental conservation. Integrating ethnobotany into secondary school curricula aligns with the national vision of promoting education that reflects local realities and values, while simultaneously supporting sustainable development and environmental stewardship.

Despite the recognition of indigenous knowledge in the national curriculum framework (MoPSE, 2015), there remains limited empirical understanding of teachers' perspectives on incorporating ethnobotanical content into classroom instruction. Teachers play a pivotal role in translating curriculum intentions into practice; therefore, their attitudes, readiness, and perceived challenges toward integrating ethnobotany are crucial for successful implementation. This study explores the views of teachers regarding the integration of ethnobotany into Zimbabwean secondary schools.

1.1. Background of the Study

Ethnobotany captures how communities identify, classify, and use plants for medicine, food, rituals, and material culture. When introduced in biology classrooms, it provides a culturally relevant approach to teaching concepts such as plant physiology, ecology, conservation, and pharmacology. Scholars argue that embedding ethnobotany within science education can enhance learner engagement by linking abstract concepts to everyday life and by validating indigenous knowledge systems (IKS) (Mavuru & Ramnarain, 2021; Shava, 2022). This approach not only promotes cultural identity but also strengthens learners' ability to apply biological concepts to their local environment.

Chivaura (2019) asserts that, in precolonial Zimbabwe, traditional education was largely informal and experiential, emphasizing the transmission of indigenous knowledge about plant species used for food and medicine. However, the introduction of colonial education systems marginalized indigenous knowledge, replacing it with Western-based curricula that often

ignored local contexts (Mapara, 2009). The result has been a persistent disconnection between learners and their cultural environment. Zimbabwe is home to diverse ecosystems and a long-standing reliance on traditional plant-based knowledge for healthcare, food security, and income generation. Recent studies highlight the continuing socio-economic importance of medicinal plants in local markets and communities, where traditional healers and herbalists play a vital role (Ngorima et al., 2021; Nyathi et al., 2022). These realities position ethnobotany as a relevant and practical content area for school biology, since students are likely to encounter the plants and practices being studied in their daily lives. Integrating such knowledge into the curriculum can thus bridge formal education with lived experience, enhancing the relevance of science learning.

Across Africa, there has been growing emphasis on decolonising curricula and integrating IKS into science education. In Zimbabwe, policy documents and curriculum reforms acknowledge the importance of contextualised and culturally grounded pedagogy (Mushayikwa, 2020). In recent years, the Government of Zimbabwe has made concerted efforts to indigenize education through curriculum reform. The Zimbabwe Curriculum Framework (2015–2022) underscores the importance of integrating indigenous knowledge systems and local content in teaching and learning. Ethnobotany, as part of environmental and cultural education, is relevant across several learning areas such as Agriculture, Science, Biology, and Heritage Studies. Integrating this knowledge not only preserves cultural heritage but also fosters critical thinking, environmental responsibility, and appreciation of biodiversity.

Globally, the inclusion of ethnobotany in formal education has been recognized as an approach to promoting sustainable development and biodiversity conservation (Hamilton, 2020). Countries such as South Africa, Kenya, and India have made strides in incorporating ethnobotanical knowledge into science and environmental education with positive outcomes for learner engagement and cultural identity (Mabogo, 2019; Singh & Gupta, 2020).

However, despite this recognition, implementation remains uneven. Challenges include a lack of clear curricular guidelines, inadequate teaching materials, and limited teacher professional development focused on ethnobotanical knowledge (Chingombe et al., 2023). These gaps

highlight the importance of examining teachers' views, since their perceptions often determine whether such content is meaningfully incorporated into classroom practice.

Teachers' attitudes, beliefs, and pedagogical content knowledge are critical determinants of curriculum implementation. Positive perceptions of ethnobotany can encourage its use in teaching, but lack of confidence or limited training can hinder its integration. Studies in Zimbabwe and beyond indicate that teachers are often receptive to IKS but face systemic barriers such as examination pressures, insufficient resources, and absence of structured professional support (Mavuru & Ramnarain, 2021; Nyathi et al., 2022). In particular, teachers' ability to bridge indigenous knowledge with scientific explanations requires targeted professional development, as well as institutional support to align local knowledge with assessment frameworks.

Integrating ethnobotany into biology education also involves ethical and pedagogical considerations. Teachers must ensure that community knowledge is used respectfully, with proper recognition of intellectual property rights and cultural sensitivities. Participatory approaches, such as involving local elders, healers, and conservationists in school activities, have been shown to enrich the learning process while maintaining cultural respect (Shava, 2022). Such approaches also promote field-based learning, connecting students directly with their environments in ways that foster ecological awareness and conservation values.

Despite these developments, in Zimbabwe, the extent to which teachers understand, appreciate, and are prepared to integrate ethnobotany into secondary school teaching remains unclear. Teachers' perceptions whether positive or negative can significantly influence the adoption of ethnobotanical content. Therefore, exploring their views provides a foundation for curriculum development, teacher training, and educational policy formulation that aligns with local realities. While studies have documented the ethnobotanical richness of Zimbabwe and the significance of IKS in education, few have explicitly explored the perspectives of secondary school biology teachers. It is therefore against this background that this study seeks to establish the views of teachers towards integrating ethnobotany into Zimbabwean Secondary schools.

1.2. Statement of the Problem

Despite the richness of Zimbabwe's ethnobotanical knowledge and its potential to enhance the relevance of biology education, this knowledge remains largely absent from the formal secondary school curriculum. Traditional plant-based practices continue to play a critical role in healthcare, livelihoods, and cultural identity across Zimbabwean communities (Ngorima et al., 2021; Nyathi et al., 2022). Yet, secondary school biology lessons often prioritise Western scientific frameworks at the expense of local knowledge systems, resulting in a curriculum that is misaligned with learners' lived experiences. This gap undermines efforts to promote contextualised science learning and contributes to the erosion of indigenous knowledge among younger generations (Shava, 2022).

Although curriculum reforms in Zimbabwe have acknowledged the importance of integrating Indigenous Knowledge Systems (IKS), including ethnobotany, practical implementation has been slow and inconsistent (Mushayikwa, 2020). Teachers are central to this process, as their perceptions, attitudes, and pedagogical strategies determine whether ethnobotanical content is meaningfully incorporated into classroo0m practice (Mavuru & Ramnarain, 2021).

To date, there is limited empirical evidence on how Zimbabwean secondary school biology teachers view the integration of ethnobotany into their teaching. Without understanding teachers' perspectives, policymakers and curriculum developers risk-designing, reforms that are either impractical or poorly supported at classroom level. This presents a significant research gap: while the ethnobotanical richness of Zimbabwe is well documented, little is known about how teachers perceive its relevance, applicability, and challenges in formal education. Addressing this gap is crucial for developing strategies that align curriculum policy, teacher training, and classroom practice, ensuring that ethnobotany can contribute effectively to both scientific literacy and cultural preservation in Zimbabwean secondary schools.

1.3. Purpose of the Study

The primary purpose of this study is to explore the views of teachers towards the integration of ethnobotany into Zimbabwean secondary schools, with a particular focus on their perceptions, attitudes, and readiness to embed indigenous plant knowledge within formal education. This investigation seeks to understand how teachers conceptualize ethnobotany as a pedagogical and cultural resource, how they perceive its relevance to curriculum goals, and

what factors influence their willingness and capacity to integrate such knowledge into teaching and learning processes.

The study further aims to identify both challenges and enabling conditions that shape the incorporation of ethnobotanical content within secondary school subjects such as Agriculture, Biology, and Heritage Studies. These subjects are particularly suited to the inclusion of ethnobotanical knowledge because they address topics related to biodiversity, culture, and sustainable resource management (Maposa & Mushayikwa, 2020). By examining teacher perspectives, the research intends to uncover the contextual factors such as institutional support, curriculum design, teacher training, and community engagement that facilitate or constrain the inclusion of indigenous plant knowledge in education (Ncube, 2022).

Additionally, this study is designed to contribute to national educational goals emphasizing curriculum indigenization and cultural relevance as outlined in Zimbabwe's Curriculum Framework for Primary and Secondary Education (2015–2022) and the National Development Strategy 1 (2021–2025) (Government of Zimbabwe, 2021). These policy documents advocate for the integration of Indigenous Knowledge Systems (IKS) into education as a means of fostering identity, environmental consciousness, and sustainable development. In this context, exploring teachers' views on ethnobotany becomes essential for understanding how such policies are perceived and implemented at the classroom level (Chinofunga, 2022).

Furthermore, the study aims to generate empirical data that can inform teacher professional development and curriculum planning. Understanding teachers' readiness and needs can guide policymakers and curriculum developers in designing capacity-building programs that enhance teacher competence and confidence in using ethnobotanical resources (Mawere & Kadodo, 2023). This aligns with the principles of culturally responsive pedagogy, which advocate for teaching approaches that reflect learners' cultural backgrounds and lived experiences (Gay, 2020).

Overall, the study's purpose is both exploratory and developmental. It seeks not only to document teachers' perspectives but also to lay the groundwork for integrating ethnobotany into Zimbabwe's education system in a structured and sustainable manner. In doing so, the research aims to bridge the gap between traditional ecological knowledge and formal science

education, promoting a holistic approach that values both local wisdom and scientific inquiry (Mutasa & Muchenje, 2021).

1.4. Objectives of the Study

The study seeks to:

1.4.1 Explore teachers' perceptions of integrating ethnobotany into secondary school curricula.

1.4.2 Examine the perceived benefits of ethnobotany integration in the teaching and learning process.

1.4.3 Identify challenges faced by teachers in integrating ethnobotanical knowledge into classroom practice.

1.4.4 Suggest strategies to enhance the effective inclusion of ethnobotany in the Zimbabwean secondary school curriculum.

1.5. Main Research Question

What are the views of teachers towards integrating ethnobotany into Zimbabwean secondary schools?

1.6. Sub-Research Questions

1.6.1 How do teachers perceive the inclusion of ethnobotany in the secondary school curriculum?

1.6.2 What are the perceived benefits of integrating ethnobotany into teaching and learning?

1.6.3 What challenges do teachers encounter in integrating ethnobotany into their classroom practice?

1.6.4 What strategies can support the effective integration of ethnobotany in secondary schools?

1.7. Basic Assumptions

The study is guided by the following assumptions:

1.7.1 Teachers have varying levels of awareness and understanding of ethnobotany.

1.7.2 Teachers' attitudes and perceptions significantly influence their willingness to integrate ethnobotanical content.

1.7.3 Institutional support and curriculum design affect the successful incorporation of ethnobotany into education.

1.8. Significance of the Study

This study carries substantial significance in policy, practice, and scholarship, particularly within the context of education reform and indigenous knowledge integration in Zimbabwean secondary schools. By exploring teachers' views on integrating ethnobotany into the curriculum, the study contributes to the broader goals of curriculum indigenization, environmental education, and cultural sustainability. The research aligns with the National Development Strategy 1 (NDS1, 2021–2025), which emphasizes the promotion of indigenous knowledge systems (IKS) and sustainable natural resource management through education (Government of Zimbabwe, 2021). Furthermore, it adds to scholarly discourse on how educational systems can become more contextually responsive to learners' cultural environments (Chinofunga, 2022; Mawere & Kadodo, 2023).

1.8.1 Teachers

For teachers, the study provides a critical lens through which they can understand the pedagogical and cultural value of integrating ethnobotany into classroom practice. It highlights how indigenous plant knowledge can enrich science and environmental education by making learning more experiential and locally grounded (Maposa & Mushayikwa, 2020). Such integration helps teachers connect theoretical concepts with learners' lived experiences, thereby promoting deeper understanding and engagement. The findings are expected to empower teachers to design lessons that draw on community-based knowledge, in line with constructivist and culturally responsive teaching approaches (Gay, 2020; Ncube, 2022). Ultimately, this supports teacher professional growth and curriculum relevance, key aspects of the Zimbabwe Curriculum Framework (2015–2022).

1.8.2 Parents

The study is also significant for parents as it bridges the gap between home and school learning. By promoting the inclusion of ethnobotanical knowledge such as the use, conservation, and cultural significance of local plants parents can recognize the relevance of school-based education to their daily lives and cultural heritage (Chavhunduka & Kwenda, 2021). This enhances their participation in educational processes and fosters intergenerational knowledge sharing, which is central to the preservation of indigenous wisdom (Shizha, 2020). As parents see their knowledge valued within the formal education system, it

encourages stronger community-school partnerships and promotes social cohesion grounded in shared cultural values.

1.8.3 Learners

For learners, integrating ethnobotany into the curriculum offers multiple educational benefits. It enhances cultural identity, environmental awareness, and practical understanding of biodiversity conservation (Mutasa & Muchenje, 2021). Exposure to indigenous plant knowledge not only strengthens learners' appreciation of local ecosystems but also encourages active participation in sustainable environmental practices (Mawere & Kadodo, 2023). Furthermore, ethnobotanical content helps make learning more meaningful, relatable, and inclusive, particularly for students from rural or indigenous communities who often find mainstream education detached from their cultural realities (Mpofu et al., 2022). This supports the development of critical thinking and a sense of responsibility toward cultural and ecological preservation.

1.8.4 Policy Makers

For policymakers and curriculum developers, this study provides evidence-based insights into the opportunities and challenges teachers face in integrating ethnobotany into teaching and learning. It informs the development of teacher education programs, instructional materials, and policy frameworks that support the institutionalization of indigenous knowledge systems in secondary education (UNESCO, 2021; Nziramasanga, 2020). The findings will guide policymakers in aligning national education goals with global sustainable development agendas, such as the United Nations Sustainable Development Goals (SDGs 4 and 15), which advocate for quality education and the protection of terrestrial ecosystems. Furthermore, the study's outcomes can contribute to revising the Zimbabwe Curriculum Framework to more explicitly accommodate ethnobotanical content, thereby strengthening education's role in cultural preservation and sustainable development.

1.9. Limitations

Every research study has inherent limitations that may influence the interpretation and generalizability of its findings. This study is no exception, and several potential limitations are acknowledged.

First, the research may be affected by response bias, particularly social desirability bias among teachers. Since ethnobotany and the inclusion of indigenous knowledge systems (IKS) are viewed positively within Zimbabwe's current educational discourse, some teachers might provide responses they perceive as socially or professionally acceptable rather than expressing their genuine views (Chinofunga, 2022). Such bias may result in an overestimation of teachers' willingness or readiness to integrate ethnobotanical knowledge into their teaching. According to Dube and Moyo (2023), teacher self-reports in culturally sensitive research often reflect conformity to policy expectations rather than authentic classroom practice, thereby influencing data accuracy.

Secondly, the limited geographical coverage of the study may constrain the generalizability of the findings. The research focuses on selected secondary schools within specific provinces, which may not fully represent the diverse socio-cultural, ecological, and economic contexts found across Zimbabwe. As pointed out by Nyoni and Chikasha (2021), variations in resource availability, community knowledge systems, and teacher training opportunities across regions often affect how indigenous knowledge is perceived and applied in schools. Therefore, while the study's findings will offer valuable insights, they should be interpreted within the context of the sampled locations.

A further limitation concerns the lack of standardized instruments for measuring teachers' attitudes toward ethnobotany integration. Since ethnobotany as a curriculum theme is still emerging within Zimbabwean education, there are few validated tools specifically designed to assess teachers' beliefs, attitudes, and readiness in this area (Mawere & Kadodo, 2023). Consequently, the study may rely on adapted or researcher-developed questionnaires and interview guides. While these will undergo validation and pilot testing, the potential for measurement error remains. As Mutasa and Muchenje (2021) observe, studies on indigenous knowledge integration often face methodological challenges due to the absence of universally accepted instruments and the context-specific nature of indigenous concepts.

Despite these limitations, the study employs triangulation combining qualitative and quantitative data collection methods to enhance credibility and minimize bias. The limitations, therefore, do not invalidate the study but instead provide context for interpreting the findings and identifying areas for further research.

1.10. Delimitations of the Study

Delimitations refer to the boundaries or scope that the researcher intentionally establishes to ensure the study remains focused and manageable (Creswell & Creswell, 2023). This study is delimited to selected Zimbabwean secondary schools, reflecting the national emphasis on integrating indigenous knowledge systems within the updated Curriculum Framework (2015–2022). The focus on secondary education is based on the assumption that this level of schooling offers the most appropriate platform for integrating ethnobotanical content, as it includes subjects that naturally lend themselves to environmental and cultural education (Chavhunduka & Kwenda, 2021).

The study will specifically involve teachers who teach Agriculture, Biology, and Heritage Studies, as these subjects directly engage with plant use, biodiversity, and cultural heritage. Such a focus allows for a more in-depth exploration of how ethnobotanical knowledge can be meaningfully embedded in the curriculum and classroom practice. Teachers of other subjects such as Mathematics, English, or Commerce are not included, as their disciplines are less directly related to ethnobotanical content (Maposa & Mushayikwa, 2020).

Geographically, the research will be conducted within selected provinces to allow for a manageable yet diverse representation of schools. This ensures that both rural and urban contexts are captured, providing comparative insights into teachers' experiences with ethnobotany integration. However, primary schools and tertiary institutions are excluded, as their curricular goals and pedagogical frameworks differ significantly from those of secondary education (Nziramasanga, 2020).

By establishing these delimitations, the researcher aims to maintain methodological clarity and ensure that the investigation remains coherent, contextually relevant, and achievable within available time and resource constraints. While this focus limits the breadth of the study, it enhances its depth and potential to generate practical recommendations for secondary school curriculum development and teacher training in ethnobotany.

1.11. Future Research

Although this study focuses on teachers' views regarding the integration of ethnobotany into Zimbabwean secondary schools, it opens several avenues for further inquiry. Future research could extend this work by exploring learners' attitudes and perceptions toward ethnobotanical

education. Understanding how students respond to lessons incorporating indigenous plant knowledge would provide deeper insights into the pedagogical effectiveness and cultural relevance of such approaches (Mpofu, Dube, & Moyo, 2022). Studies focusing on learner engagement and knowledge retention could help educators refine strategies for teaching ethnobotanical content in ways that enhance both academic achievement and cultural appreciation (Gay, 2020).

In addition, future research could focus on the development and evaluation of instructional materials that integrate ethnobotanical knowledge into subjects such as Agriculture, Biology, and Heritage Studies. Developing locally grounded teaching resources such as illustrated manuals, digital modules, or community-based field guides would support teachers in implementing culturally responsive curricula (Maposa & Mushayikwa, 2020). According to Mawere and Kadodo (2023), locally relevant educational resources play a vital role in promoting environmental literacy and sustainable use of biodiversity in African schools.

Another promising area for future inquiry involves examining community participation in the process of integrating local knowledge into formal education. Ethnobotanical knowledge is often community-based and orally transmitted, hence involving elders, traditional healers, and local conservationists in school programs could foster intergenerational knowledge transfer and environmental stewardship (Chavhunduka & Kwenda, 2021). Future research might therefore investigate models of school–community collaboration, identifying best practices for embedding local expertise in curriculum delivery.

Longitudinal studies could also assess the impact of ethnobotany integration on learners' environmental attitudes, career interests, and sustainable practices. Such studies would provide empirical evidence on how education rooted in indigenous knowledge can contribute to achieving national goals on biodiversity conservation and sustainable development (UNESCO, 2021; Government of Zimbabwe, 2021). Through these future directions, research on ethnobotany in education could expand from teacher perceptions to systemic, community-based, and learner-centred frameworks that promote both cultural revitalization and ecological sustainability.

1.12. Definition of Key Terms

To ensure conceptual clarity and consistency, the following key terms are defined as they are used in this study:

1.12.1 Ethnobotany: Ethnobotany refers to the scientific study of the relationship between people and plants, particularly focusing on how communities identify, use, and manage plant species for food, medicine, rituals, and economic purposes (Cotton, 2020). It examines traditional plant knowledge systems as well as their cultural meanings, providing a bridge between botanical science and anthropology (Mutasa & Muchenje, 2021). In the context of this study, ethnobotany encompasses the indigenous knowledge of Zimbabwean communities concerning plant use and its potential integration into secondary school education.

1.12.2 Indigenous Knowledge Systems (IKS): IKS denotes the cumulative body of knowledge, skills, and practices developed by local communities over time through sustained interaction with their natural and cultural environments (Shizha, 2020). It includes ecological, agricultural, medicinal, and social knowledge passed orally or through practice, forming a cornerstone of community identity and survival. UNESCO (2021) emphasizes that integrating IKS into education fosters cultural relevance and sustainable resource management. Within this study, IKS provides the foundational framework for understanding how ethnobotanical knowledge can enrich the formal education curriculum in Zimbabwe.

1.12.3 Integration: Integration refers to the process of systematically embedding ethnobotanical knowledge and practices into formal secondary school curricula (Ncube, 2022). It involves aligning indigenous content with existing academic standards, instructional strategies, and assessment systems to create a culturally inclusive learning experience. Effective integration seeks to harmonize traditional and scientific worldviews, enabling learners to appreciate both local and global perspectives on environmental and biological systems (Maposa & Mushayikwa, 2020).

1.12.4. Perceptions: Perceptions, in the context of this research, refer to teachers' beliefs, attitudes, and opinions regarding the inclusion of ethnobotany in education. Perceptions influence teachers' motivation, willingness, and confidence to implement curriculum changes (Chinofunga, 2022). As Dube and Moyo (2023) note, understanding teachers' perceptions is

essential in shaping professional development programs that support the successful integration of indigenous knowledge systems into classroom instruction.

1.13. Organisation of the study

Chapter 1 is about background of the study, statement of a problem, research objectives, research questions, and significance of study. It also looked at limitations, delimitation of the study and finally defined the key concepts used in the study. Chapter 2 focused on literature review. Chapter 3, presents the methodological considerations for the study. Chapter 4, presents the findings of this study. Finally, chapter 5 presents the conclusion and the recommendations of the study.

1.14. Summary

This chapter introduced the study by outlining its background, purpose, and significance. It established the context of ethnobotany within Zimbabwe's educational landscape and identified the research problem concerning teachers' views on its integration. The chapter further presented the objectives, research questions, assumptions, limitations, delimitations, and key term definitions. The next chapter will present a review of related literature focusing on previous studies, challenges, and conceptual and theoretical frameworks underpinning the integration of ethnobotany in education.

Chapter 2. Theoretical Framework and Literature Review

2.0. Theoretical Framework

This study is anchored in Constructivism and De-Colonial Theory theories that explain how knowledge, culture, and pedagogy interact in shaping teaching and learning. These theories provide the foundation for examining biology teachers' views on integrating ethnobotany into Zimbabwean secondary schools.

2.1. Constructivist-Learning Theory

Constructivism posits that learners actively build knowledge through experiences and interactions, rather than passively receiving information (Piaget, 1972; Vygotsky, 1978). Within this framework, ethnobotany serves as an authentic, experience-based context through which learners can make sense of abstract scientific concepts. For instance, linking plant physiology to traditional medicinal uses allows learners to connect prior cultural knowledge with formal scientific explanations, thereby deepening understanding. Recent studies affirm that constructivist strategies, such as inquiry-based and problem-solving tasks grounded in indigenous knowledge, foster higher learner engagement and conceptual retention (Mavuru & Ramnarain, 2021; Chingombe et al., 2023).

2.2. De-colonial Theory

De-colonial perspectives emphasise the dismantling of Eurocentric dominance in education and the recognition of indigenous epistemologies as legitimate sources of knowledge (Mignolo, 2011; Ndlovu-Gatsheni, 2018). Applied to this study, de-colonial theory provides a

lens for understanding the marginalisation of ethnobotanical knowledge within Zimbabwe's biology curriculum, which often privileges Western scientific paradigms. Integrating ethnobotany into biology classrooms becomes not only a pedagogical act but also a de-colonial project that restores the value of African ways of knowing. Recent work on decolonising STEM education underscores the need for curricula that are both scientifically robust and contextually grounded (Shava, 2022; Nyathi et al., 2022).

The integration of technology into ethnobotany-based teaching and learning enables tachers to preserve indigenous knowledge, enhance learner engagement, and bridge traditional ecological knowledge with modern scientific inquiry (Bussmann & Sharon, 2016; McCarter et al., 2014). Through digital tools, ethnobotanical knowledge can be documented, visualized, analysed, and disseminated in ways that are pedagogically meaningful and culturally responsive.

One significant connection between ethnobotany and technology lies in the digital documentation and preservation of indigenous plant knowledge. Technologies such as mobile applications, digital databases, Geographic Information Systems (GIS), and multimedia recording tools allow learners and teachers to collect, store, and analyze information on medicinal plants, food crops, and culturally significant flora (Kahn et al., 2020). In educational contexts, learners can use smartphones or tablets to photograph plants, record elders' narratives, and map plant distribution, thereby transforming ethnobotanical learning into an interactive, inquiry-based process. This use of technology supports experiential learning while addressing concerns about the erosion of indigenous knowledge systems (UNESCO, 2019).

Technology also facilitates the integration of ethnobotany into science and biology curricula through virtual simulations, digital herbariums, and online learning platforms. Virtual laboratories and augmented reality (AR) applications enable learners to explore plant structures, uses, and ecological roles without being limited by geographic or seasonal constraints (Ibáñez et al., 2020). When combined with ethnobotanical perspectives, these technologies help learners connect abstract scientific concepts such as plant physiology or biodiversity conservation to culturally grounded, real-world examples. This alignment enhances conceptual understanding and relevance, particularly for learners from indigenous or rural communities (Aikenhead & Elliott, 2010).

Furthermore, technology supports collaborative and culturally responsive pedagogy in ethnobotany education. Online discussion forums, learning management systems, and social media platforms enable learners to share ethnobotanical findings, compare plant uses across cultures, and engage in cross-community knowledge exchange (Gay, 2018). Such digital collaboration encourages respect for cultural diversity while fostering critical thinking and digital literacy skills. In this way, technology becomes a mediating tool that positions ethnobotanical knowledge as legitimate and valuable alongside Western scientific knowledge systems.

In addition, the use of technology in ethnobotany education promotes sustainable development and environmental awareness. Digital storytelling, documentary videos, and interactive maps can be used to highlight indigenous conservation practices and sustainable plant use, aligning ethnobotanical learning with global sustainability goals (Sterling et al., 2017). Learners are thus empowered to use technology not only as consumers of information but also as creators of knowledge that supports environmental stewardship and community well-being.

Thus , the connection between ethnobotany and technology use in teaching and learning lies in technology's capacity to preserve indigenous knowledge, enrich pedagogical practices, and contextualize scientific learning within learners' cultural environments. By integrating digital tools with ethnobotanical content, educators can create inclusive, engaging, and culturally grounded learning experiences that bridge traditional knowledge systems and modern educational demands.

2.3. Teachers' perceptions of integrating ethnobotany into secondary school curricula

Teachers play a pivotal role in mediating the relationship between policy and practice. Their perceptions of ethnobotany determine how far it becomes part of classroom discourse. Research shows that many teachers acknowledge the potential benefits of using indigenous knowledge in science teaching but express concerns about limited training, lack of teaching resources, and unclear curriculum guidelines (Chingombe et al., 2023; Oyetoro & Babarinde, 2021). Thus, for example, a teacher who perceives ethnobotany as culturally significant but feels ill prepared to teach it might avoid integrating it, thereby limiting its reach. Conversely,

teachers who are confident in linking ethnobotanical knowledge with scientific principles often report enhanced learner participation and curiosity (Mavuru & Ramnarain, 2021).

Several studies report that teachers view ethnobotany as highly relevant for learner engagement and for making abstract botanical concepts tangible (Chingombe et al., 2023; Oyetoro & Babarinde, 2021, Mavuru & Ramnarain, 2021). Non-formal and classroom interventions that foreground local aromatic or medicinal plants show measurable gains in learners' plant knowledge and enthusiasm, and teachers involved in such projects commonly report that linking school lessons to community plant knowledge increases students' motivation and sense of relevance (Gutiérrez-García, 2024). Similarly, ethnobotany-based inquiry models, where learners identify, observe, and investigate plants used locally, have been documented as effective at promoting environmental literacy and stewardship attitudes, outcomes teachers cite as important goals of secondary biology education (Lestari, 2024). These reports suggest that when teachers perceive a clear alignment between ethnobotany activities and desired learner's outcomes (interest, skills, local relevance); they are favourably disposed to integrate such content.

Mavuru and Ramnarain (2021) argues that beyond engagement and learning gains, teachers frequently emphasize the cross-curricular affordances of ethnobotany. Ethnobotanical topics naturally bridge biology with history, cultural studies, health education, and environmental science; many teachers appreciate this interdisciplinary because it allows them to develop lessons that reflect ecological, social, and cultural dimensions of learning rather than narrow factual recall (Mavuru & Ramnarain, 2021). Research into botanical literacy also reinforces teachers' positive views, as calls to counter plant blindness grow; teachers increasingly see plant-centred curricula as essential for developing the cognitive, attitudinal, and practical dimensions of botanical competence (Arif, 2025).

Arif, (2025) asserts that despite these perceived benefits, a convergent body of literature documents important barriers that shape teachers' attitudes and practical readiness. National curriculum structures and high-stakes assessment regimes are repeatedly cited as the most salient systemic constraints, when syllabi are tightly prescribed and examinations privilege content unlikely to incorporate local plant knowledge; teachers report limited autonomy to introduce ethnobotany without jeopardizing exam preparation (da Silva, 2024). In such contexts, positive perception alone is insufficient to produce classroom change.

Closely related is teacher knowledge and confidence. Multiple qualitative studies show that many in-service secondary teachers lack formal training in ethnobotany, local taxonomy, or culturally responsive methods for working with Indigenous or community knowledge holders; this lack of content knowledge undermines pedagogical confidence and increases teachers' perceived risk of misrepresenting or oversimplifying local plant uses (Ahanonye et al., 2024). Intervention studies therefore emphasize the importance of targeted professional development (PD) that combines botanical identification skills, inquiry-based instructional strategies, and ethical frameworks for engaging with community knowledge; when such PD is provided, teachers' self-efficacy and willingness to implement ethnobotany modules rise noticeably (Lestari, 2024).

Ethical and epistemological issues further complicate teachers' orientations. Arif, (2025) argues that integrating Indigenous and local ecological knowledge into classrooms must be done with attention to consent, attribution, and the risk of decontextualizing practices that have cultural and spiritual significance. Teachers express concern about taking community knowledge into the classroom inappropriately and about the safety implications of teaching medicinal uses without adequate scientific framing or safeguards. Studies recommend participatory, community-partnered curriculum design co-creating lessons with knowledge holders to mitigate these ethical tensions and to build teacher confidence (da Silva, 2024; Compan et al., 2025).

Practical limitations lack of locally relevant teaching materials, constrained budgets for fieldwork or school gardens, and insufficient access to diagnostic tools or herbarium resources are also frequently noted (Arif, 2025). Where teacher toolkits, plant inventories, and ready-to-use lesson exemplars exist, teachers are more likely to adopt ethnobotany activities; conversely, the absence of such resources increases the perceived burden of implementation and reduces uptake (Compan et al., 2025). Recent work therefore calls for the production and dissemination of open-access, culturally sensitive teacher materials mapped to national standards to lower the entry cost for teachers.

Teachers are receptive to ethnobotany's pedagogical promise but require systemic supports such as policy flexibility, resources, and community partnerships to translate positive perceptions into sustainable classroom practice (Ahanonye et al., 2024; Gutiérrez-García, 2024; Rinto, 2023). Thus, professional learning programs that pair botanical content knowledge with culturally responsive pedagogy and community co-design are essential to

increases teacher efficacy and helps resolve ethical concerns. Arif, (2025) posits that curriculum developers and assessment bodies should be engaged to identify alignment points where ethnobotany can address existing standards rather than compete with them pilot modules that map ethnobotany-learning objectives to national examination competencies have considerable persuasive power for teachers working in exam-driven systems.

In sum, the literature portrays teachers as potential champions of ethnobotany in secondary education; they appreciate its capacity to make science local, interdisciplinary, and meaningful. Yet converting favourable perceptions into routine practice requires concerted investments in teacher knowledge, ethical community partnerships, curricular alignment, and practical resources. Where these supports are present, ethnobotany can serve as a powerful vehicle for botanical literacy and culturally responsive science education; where they are absent, teachers' positive views remain largely aspirational.

2.3 The perceived benefits of ethnobotany integration in the teaching and learning process.

A central and consistently reported benefit is that ethnobotany makes learning more relevant to learners by linking curricular content to local landscapes, livelihoods, and cultural practices. Several classroom-based interventions and case studies document teachers' reports that lessons grounded in local plant uses or in field activities (school garden work, plant walks, interviews with community knowledge holders) produce higher levels of learner interest and participation than equivalent lessons taught only through textbook material (Lestari, 2024; Compan et al., 2025). These studies attribute gains in engagement to the immediate personal and cultural relevance of the subject matter in which learners see plants as part of family practices, food systems, and health traditions rather than as distant abstract categories making ethnobotany a powerful hook for introducing plant science and ecological concepts.

A related, well-documented benefit is the enhancement of botanical literacy, the set of knowledge, skills, and dispositions needed to recognize, name, and understand plants in ecological and cultural contexts (Lestari, 2024; Compan et al., 2025). Research on plant awareness formerly called plant blindness and interventions to counter it demonstrates that active, field-based, or game-based approaches such as species-recognition games, local species inventories, can measurably increase learners' species knowledge and attention to

plants, outcomes that ethnobotany infused curricula are particularly well placed to deliver (Lindemann-Matthies et al., 2024; Parsley et al., 2022). By centring lessons on local species and uses, ethnobotany both supplies content for species-level learning and situates botanical knowledge within socially meaningful frameworks, which enhances retention and transfer.

Ethnobotany's focus on the relationships between people and plants naturally links classroom learning to conservation issues and sustainable resource use. Several authors argue that learning activities that require learners to document local plant uses, assess resource pressures, or participate in gardening projects lead to stronger pro-environmental attitudes and a greater sense of responsibility for local biodiversity (Compan et al., 2025; Mercier, 2025). When learners understand that particular plants provide medicine, food, or materials for their communities, the moral and practical reasons for protecting those species become more salient than when plants are presented only as abstract organisms (Lestari, 2024; Compan et al., 2025).

Ethnobotany is uniquely positioned to bridge natural science content with cultural studies, local history, health education, and even economics, yielding a curriculum that resonates with learners' identities and community knowledge (Lestari, 2024; Compan et al., 2025). Several studies emphasize that ethnobotanical modules can operationalize culturally responsive pedagogy by validating local and Indigenous knowledge systems in classroom learning and by engaging community knowledge holders as co-educators or sequence partners (Rinto, 2023; Aziz et al., 2022). Lestari (2024) argues that teachers who adopt ethnobotany report that cross-curricular projects such as a module tracing a crop's biology, its economic role, and its cultural uses, support deeper learning and offer multiple entry points for students with diverse strengths and backgrounds.

The study by de Borba Antonelli et al., (2024) revealed that ethnobotany naturally lends itself to inquiry-based learning that includes plant identification, documentation, simple phytochemical observations, and community interviews for authentic scientific practices that build observational acuity, data-collection routines, and basic experimental reasoning. Empirical work on inquiry-ethnobotany pedagogies shows that learners engaged in these practices develop procedural skills such as field methods, mapping, and herbarium preparation and improved scientific reasoning compared with passive learning formats (Lestari, 2024). Teachers consistently perceive these hands-on activities as valuable for fostering practical competencies that align with science process standards.

A frequently noted social benefit is the role ethnobotany can play in strengthening links between schools and local communities. By inviting elders, healers, or local artisans to contribute plant knowledge, schools become nodes for intergenerational knowledge transmission an outcome valued by communities and teachers alike (de Borba Antonelli et al., 2024; Compan et al., 2025). For learners from communities whose knowledge has been historically marginalized, ethnobotany lessons can validate cultural identity and improve learners' sense of belonging and academic confidence (de Borba Antonelli et al., 2024). Studies show that such identity-affirming effects also increase engagement and persistence in science learning for underrepresented learners (de Borba Antonelli et al., 2024).

In summary, the literature shows that ethnobotany has the potential to transform plant-centred science education by making it more relevant, interdisciplinary, and action-oriented. Studies revealed benefits such as improved engagement, better botanical literacy, enhanced stewardship, and richer community connections. However, these benefits depend on intentional design such as teacher capacity building, curricular fit, ethical community collaboration, and appropriate resourcing.

2.4. Challenges faced by teachers in integrating ethnobotanical knowledge into classroom practice.

Several challenges hinder the meaningful integration of ethnobotany into school biology. , Chingombe et al. (2023) asserts that the lack of structured teaching materials, textbooks, and assessment tools aligned with ethnobotanical content creates practical difficulties for teachers. The dominance of Western scientific paradigms within the curriculum often positions indigenous knowledge as secondary, leading to tensions about credibility and validity (Shava, 2022). Cultural and ethical concerns, such as intellectual property rights and respect for community knowledge, require careful navigation to avoid exploitation or misrepresentation (Nyathi et al., 2022). The study by Mushavikwa (2020) noted that systemic barriers such as overcrowded classrooms, limited laboratory resources, and pressure to meet examination requirements further discourage innovation in teaching.

A primary structural barrier is the dominance of tightly prescribed curricula and high-stakes examinations that leave little room for locally tailored content. Teachers working in exam-driven systems report that syllabus constraints and the imperative to cover examinable content make it difficult to allocate time for ethnobotanical modules, regardless of teachers'

favourable attitudes (Mlotshwa, 2024; Compan et al., 2025). Several systematic reviews into integrating Indigenous or local knowledge into formal education similarly conclude that when national or regional curricula do not explicitly accommodate such content, teachers prioritize tested material over culturally relevant enrichment (da Silva, 2024). Thus, curriculum inflexibility is repeatedly identified as a gatekeeper to classroom implementation.

Chingombe et al., (2023) argues that many secondary teachers lack formal training in ethnobotany, plant identification, or culturally responsive approaches to local knowledge, which undermines their confidence and willingness to teach ethnobotanical topics. Qualitative studies and intervention reports show that teachers fear misidentifying species, presenting inaccurate information about medicinal uses, or unintentionally offending community knowledge holders is a concerns that reduce uptake unless targeted professional development is provided (Lestari, 2024; Rinto, 2023). Reviews of teacher preparedness for plant-focused curricula also emphasize that plant education has historically been a weak point in biology instruction, reinforcing the need for sustained capacity building (Parsley et al., 2022; Marcos-Walias et al., 2023).

Practical material barriers such as lack of local teaching materials, field equipment, and herbarium access, school garden space, transport for excursions, and budgets for consumables are frequently reported (Chingombe et al., 2023). Studies that pilot ethnobotany modules emphasize that teachers can deliver only limited activities when resources are scarce, which often reduces projects to one-off experiences rather than sustained curricular practice (Compan et al., 2025; Mlotshwa, 2024). Integrating Indigenous and community plant knowledge raises ethical questions that teachers must navigate such as who owns traditional knowledge, how should consent and attribution be managed, and how can sensitive cultural practices be represented respectfully without appropriation or commodification (Chingombe et al., 2023). Scholars and practitioners emphasize that teachers worry about decontextualizing knowledge, violating community protocols, or inadvertently sharing information that communities consider sacred or proprietary (Schunko et al., 2024; Rinto, 2023). These concerns are heightened when teachers lack clear ethical guidelines or institutional support for community engagement, making them reluctant to proceed without co-developed protocols.

While community engagement is often framed as a benefit of ethnobotany, forming and sustaining equitable partnerships is itself challenging. Teachers report logistical difficulties

that include scheduling, compensation for knowledge holders, epistemic tensions that include differences between scientific framings and local explanatory models, and concerns about extracting knowledge rather than building reciprocal relationships (Compan et al., 2025; de Borba Antonelli et al., 2024). Studies recommend co-design models and long-term relationship-building, but note that the time and institutional backing required can exceed what many teachers can manage within everyday workloads.

Teaching about plants that have medicinal or toxic properties introduces safety concerns. Teachers express unease about demonstrating or endorsing plant uses that could cause harm if practiced incorrectly; this is compounded by lack of clear school policies on treating traditional medicines, administering remedies, or bringing external practitioners into school (Lestari, 2024; Rinto, 2023). Thus, liability concerns can induce school administrators to restrict such activities, even when teachers value them pedagogically.

2.5. Strategies to enhance the effective inclusion of ethnobotany in the Zimbabwean secondary school curriculum.

Research across southern Africa and other regions has increasingly emphasized that meaningful integration of ethnobotany into school curricula requires deliberate policy alignment, teacher preparation, curriculum reform, and strong community partnerships (Compan et al., 2025; Mlotshwa, 2024; Schunko et al., 2024).

One of the most fundamental strategies identified in the literature is the establishment of clear policy and curricular frameworks that formally recognize ethnobotany as part of the national education agenda. Studies show that teachers are more likely to implement Indigenous knowledge based content when it is explicitly endorsed within national policies and syllabi (da Silva, 2024; Mlotshwa, 2024). In Zimbabwe, the Education Sector Strategic Plan (ESSP 2021–2025) and the Curriculum Framework for Primary and Secondary Education already emphasize contextualized learning and the incorporation of Indigenous knowledge (Ministry of Primary and Secondary Education [MoPSE], 2021). However, scholars such as Mutseekwa (2021) and Sunzuma et al. (2022) argue that policy intent must be translated into practical curricular guidance that clearly demonstrates how ethnobotanical content aligns with existing learning objectives, particularly in science and environmental studies. Policy-level clarity would reduce teachers' uncertainty about curriculum boundaries and encourage innovation

while maintaining alignment with the Zimbabwe School Examinations Council (ZIMSEC) assessment standards.

Closely linked to policy reform is the need for curriculum mapping and modular design. Researchers emphasize that teachers working in exam-oriented systems such as Zimbabwe's face significant pressure to cover examinable content, often at the expense of contextual learning opportunities (Compan et al., 2025). Integrating ethnobotany effectively therefore requires identifying intersections between existing syllabus topics such as plant physiology, ecology, and environmental sustainability and ethnobotanical themes. Lestari (2024) proposes modular, inquiry-based approaches that embed local plant knowledge within standard science topics while retaining scientific rigor. Similarly, Gutiérrez-García (2024) argues that ethnobotany can enrich conceptual understanding of biodiversity when aligned with formal learning outcomes. By designing short, standards-linked ethnobotany modules within the science curriculum, Zimbabwean teachers can ensure that local knowledge complements rather than competes with examinable content.

Teacher preparation and professional development emerge as another vital component for successful integration. Several studies highlight that teachers often lack both botanical expertise and pedagogical confidence to teach ethnobotanical topics effectively (Parsley et al., 2022; Mlotshwa, 2024). In many African contexts, teacher's express anxiety about misrepresenting Indigenous knowledge or offending cultural norms (Rinto, 2023). To address this, sustained and practice-oriented professional development programs are recommended, emphasizing both scientific and cultural dimensions of ethnobotany (Schunko et al., 2024). Such programs could combine workshops on plant identification, lesson design, and ethical engagement with local communities. Within Zimbabwe, Mutseekwa (2021) and Sunzuma et al. (2022) advocate for a cascade model of professional learning, where trained lead teachers mentor peers in their provinces, ensuring sustainability and capacity building across the education system.

Community participation and co-design are also central to effective ethnobotany education. Ethnobotany is deeply rooted in local cultural heritage; thus, communities are not just sources of content but essential partners in curriculum development and delivery. Recent research emphasizes the need for equitable partnerships between schools and communities to avoid the exploitation or misrepresentation of traditional knowledge (Schunko et al., 2024; de Borba Antonelli et al., 2024). In practice, this involves establishing ethical protocols, informed

consent, and benefit-sharing arrangements when documenting or teaching traditional plant uses. For Zimbabwe, where traditional healers, farmers, and elders hold rich ethnobotanical knowledge, structured collaboration between schools and community knowledge holders can enhance authenticity and relevance in teaching. Such partnerships also support the Heritage-Based Education philosophy outlined in Zimbabwe's curriculum framework (MoPSE, 2021).

The provision of appropriate teaching and learning resources is another crucial factor. Teachers often cite the lack of suitable materials such as local plant guides, fieldwork equipment, and laboratory facilities as barriers to implementation (Mlotshwa, 2024). Low-cost, context-specific resources can bridge this gap. Compan et al. (2025) recommend that ministries of education collaborate with universities and botanical institutions to develop localized teaching aids, digital plant databases, and mobile identification tools. Thus, in Zimbabwe, partnerships with institutions such as Botanical Garden and local universities could facilitate the production of multilingual plant manuals and herbarium starter kits. Digital innovations, including mobile ethnobotany apps or offline multimedia resources, can further enhance access, especially in rural schools with limited internet connectivity (Chingombe et al., 2023).

Another promising strategy is the incorporation of school gardens, field excursions, and citizen-science projects into the curriculum. Experiential learning has been shown to strengthen learners' understanding of both scientific and cultural aspects of plant use (Gutiérrez-García, 2024). School gardens can function as living laboratories where learners learn plant identification, conservation techniques, and sustainable agricultural practices (Chingombe et al., 2023). Thus, in Zimbabwe, these initiatives can be integrated with ongoing environmental education and agricultural programs, reinforcing national priorities around climate resilience and food security. Field-based learning also allows learners to interact directly with community knowledge holders, promoting respect for Indigenous wisdom while developing scientific inquiry skills.

Chingombe et al., (2023) posits that assessment reform is equally important to sustain teacher motivation and ensure that ethnobotanical learning is valued within formal education. Thus, since teachers prioritize content that is assessed, embedding ethnobotany within ZIMSEC assessment structures would encourage widespread adoption. Scholars argue for the use of performance-based assessments, portfolios, and project evaluations that capture learners'

practical and critical thinking skills (da Silva, 2024; Mlotshwa, 2024). Such methods align with Zimbabwe's competency-based curriculum, which emphasizes applied knowledge and problem-solving abilities. Introducing ethnobotany-related tasks within school-based continuous assessment could legitimize these practices and promote their institutionalization.

Contemporary literature suggests that integrating ethnobotany successfully requires collaboration among education ministries, universities, NGOs, and local communities (Sunzuma et al., 2022; Compan et al., 2025). These partnerships can provide technical expertise, funding, and mentorship. Continuous evaluation and research are also essential to document the impact of ethnobotany education on learners' learning outcomes, conservation attitudes, and community engagement (Chingombe et al., 2023). Thus, Universities in Zimbabwe could play a leading role in evaluating pilot projects and developing teacher education curricula that embed ethnobotanical literacy.

2.6. Summary of the chapter.

The chapter presented the theoretical frameworks underpinning the study, which combine constructivist and de-colonial perspectives within a culturally responsive, place-based education model. These frameworks will guide the analysis of teachers' views and inform recommendations for improving the integration of ethnobotany into Zimbabwean secondary schools. This chapter also reviewed existing literature on the integration of ethnobotany and Indigenous Knowledge into education, with emphasis on teachers' perceptions, challenges, and strategies across different contexts. Studies from Zimbabwe and other countries demonstrate that while teachers generally value the inclusion of ethnobotany for its cultural and educational relevance, they face considerable barriers, including lack of training, resource shortages, and rigid curricula. International experiences suggest that effective integration requires a systemic approach involving teacher professional development, curriculum flexibility, community partnerships, and adequate resource provision. The next chapter outlines the methodology adopted for the study, detailing the research design, population, data collection, and analysis procedures.

Chapter 3 Methodology

3.0. Research Methodology

3.1. Introduction

This chapter outlines the methodological approach adopted to investigate the views of biology teachers towards integrating ethnobotany into Zimbabwean secondary schools. The

methodology was designed to generate rich, contextually grounded insights into teachers' perceptions, attitudes, and experiences, as well as the factors that facilitate or constrain the integration of ethnobotany into classroom practice. The chapter details the research paradigm, methodology, and research design, providing a rationale for the choices made in the context of the study's objectives and research questions.

3.2. Research Paradigm

This study is guided by a constructivist paradigm, which posits that knowledge is socially constructed and that understanding is derived from participants' lived experiences (Creswell & Poth, 2018). The paradigm aligns with the study's focus on teachers' perspectives, allowing the researcher to explore how biology teachers make sense of ethnobotany within the context of their classrooms, schools, and communities. The approach recognises that teachers' beliefs and attitudes are shaped by cultural, institutional, and personal factors, and it emphasizes the importance of capturing these subjective meanings rather than imposing external assumptions (Merriam & Tisdell, 2016).

The constructivist paradigm is particularly suitable because the study seeks to understand ho w and why teachers perceive the integration of ethnobotany, rather than to quantify the phenomenon. This approach supports an in-depth exploration of contextual realities and provides rich, qualitative insights into the complexities of curriculum implementation, pedagogical decision-making and cultural considerations in Zimbabwean secondary schools.

3.3. Research Methodology

The study employs a qualitative research methodology, which is appropriate for examining complex social phenomena such as teachers' perceptions, attitudes, and practices (Creswell & Poth, 2018). Qualitative research enables the researcher to gather detailed, nuanced data through direct engagement with participants, facilitating an understanding of the meanings teachers attach to ethnobotany and its role in biology education.

Qualitative methodology allows for flexibility in exploring unanticipated themes that may emerge during data collection, which is critical when investigating a context-specific topic such as the integration of indigenous knowledge. Through qualitative methods, the study captures the richness of teachers' experiences, including their challenges, opportunities, and strategies for integrating ethnobotany into biology lessons.

3.4. Research Design

The study adopts a case study research design, focusing on secondary school biology teachers in selected schools across Zimbabwe. The case study design is appropriate because it allows for an in-depth examination of a bounded system (teachers and their classrooms) within its real-life context (Yin, 2018). This design facilitates a detailed exploration of teachers' views while considering the institutional, cultural, and community factors that influence curriculum implementation.

The case study approach enables the use of multiple data sources, including semi-structured interviews, focus group discussions, and document analysis, to triangulate findings and enhance the trustworthiness of the results. By selecting a purposive sample of biology teachers from diverse schools, the study captures a range of perspectives, ensuring that the findings reflect both common patterns and unique contextual variations.

The design is also flexible enough to accommodate exploratory questions and to uncover barriers, opportunities, and strategies for integrating ethnobotany that may not be immediately evident from curriculum documents or policy statements alone. This ensures that the research produces actionable insights relevant to teachers, curriculum developers, and policymakers.

3.5. Population, Sample, and Sampling Procedure

3.5.1. Population

The total population for this study comprised all secondary school biology teachers in Mbire District, Mashonaland Central Province of Zimbabwe. According to the Mbire District Education Office (2024), there are 17 secondary schools in the district, with an average of 2 biology teachers per school, yielding an estimated total population of 34 biology teachers. These teachers are responsible for implementing the Zimbabwean Ordinary Level and Advanced Level Biology syllabi, which include topics such as ecology, plant physiology, and biodiversity, areas in which ethnobotanical knowledge is most relevant.

This population was considered suitable because biology teachers are the principal implementers of the science curriculum, and their attitudes, beliefs, and pedagogical practices directly affect whether ethnobotanical content is integrated into teaching and learning

(Mavuru & Ramnarain, 2021). By focusing on this specific group, the study ensured that the insights obtained were both relevant and actionable for improving culturally responsive biology education in Zimbabwe.

3.5.2. Sample

Fifteen biology teachers were purposively selected from ten secondary schools across Mbire District in Mashonaland Central Province. On average, two biology teachers were drawn from each participating school. The choice of this sample size was carefully guided by the principles of qualitative research, where the focus is not on statistical generalization but on the depth, richness, and contextual relevance of the data collected. According to Creswell and Poth (2018), qualitative studies typically employ smaller, information-rich samples that enable the researcher to gain an in-depth understanding of participants' experiences and perspectives. Therefore, a sample of fifteen participants was deemed sufficient to achieve data saturation where no new insights emerge from additional interviews while still allowing for manageable data collection, transcription, and analysis.

The selection of the ten schools followed a purposive sampling strategy designed to ensure representation from varied educational and socio-cultural contexts within Mbire District. The district comprises a mixture of rural, mission, and peri-urban settings, each offering distinct learning environments and resource conditions. To reflect this diversity, the study included seven rural day secondary schools, one mission boarding school, and peri-urban government schools. This distribution was intentional and strategic, ensuring that the study captured the unique experiences and perspectives of biology teachers operating under different institutional and community conditions.

The inclusion of rural day secondary schools was particularly important because these schools often serve communities with strong indigenous knowledge systems and close interaction with local flora. Teachers in these contexts are more likely to have direct exposure to ethnobotanical knowledge and to understand how such knowledge can be integrated into the biology curriculum. However, these schools often face challenges such as limited resources, lack of teaching aids, and insufficient teacher training. Capturing teachers' perspectives from these settings was therefore crucial for understanding both the potential and constraints of implementing ethnobotany in low-resource environments.

The mission boarding school was included because it has relatively better infrastructure, more qualified teachers, and well-established science programs. Teachers in mission schools may have different levels of exposure to formal training and access to teaching materials, which can influence their perceptions and confidence in integrating ethnobotany into their lessons. Their experiences provide valuable comparative insights into how institutional support and educational resources shape teachers' engagement with indigenous knowledge.

The peri-urban government schools were selected to represent more modernized learning environments, often characterized by diverse learner populations and exposure to globalized scientific perspectives. Teachers in these schools may face different challenges, such as limited curriculum flexibility or a stronger emphasis on examination-driven instruction. Including their perspectives allowed the study to examine whether teachers in more urbanized settings perceive ethnobotany as relevant or peripheral to their teaching practice, thereby broadening the scope of analysis across different socio-educational contexts.

The combination of these school types ensured that the study achieved maximum variation sampling**,** a technique recommended by qualitative researchers such as Merriam and Tisdell (2016). This approach captures a wide range of experiences and perspectives, thereby enriching the data and enhancing the transferability of the findings. By including teachers from different school settings ranging from under-resourced rural schools to better-equipped mission and urban institutions, the study was able to identify both common themes and context-specific challenges related to the integration of ethnobotany in biology education.

Two teachers per school were purposively selected for an adequate balance between individual depth and contextual diversity. Having more than one teacher from each school enabled comparison of perspectives within the same institutional environment, revealing how factors such as professional collaboration, school leadership, and resource availability might influence individual attitudes and practices. At the same time, limiting the number to two teachers per school kept the data collection process manageable and ensured that each participant could be engaged through comprehensive, one-on-one interviews. This balance between depth and breadth is essential in qualitative inquiry, as it allows the researcher to capture detailed narratives without compromising the analytical rigor required for thematic interpretation (Creswell & Poth, 2018).

In summary, the purposive selection of fifteen biology teachers from ten strategically chosen schools was designed to ensure a well-rounded understanding of teachers' views toward integrating ethnobotany into the secondary school biology curriculum. The sampling strategy provided access to a variety of teaching contexts, from resource-limited rural schools to well-supported mission and urban institutions. This diversity not only strengthened the richness and trustworthiness of the data but also ensured that the findings reflected the complex realities of biology education in Zimbabwean secondary schools.

3.5.3. Sampling Procedure

The study employed a purposive sampling strategy, supplemented by maximum variation sampling, to ensure that the selected participants reflected a wide range of experiences, teaching contexts, and professional backgrounds among secondary school biology teachers in Mbire District. This combination of sampling methods was deliberately chosen to obtain rich, detailed, and diverse qualitative data that could illuminate the complexities of integrating ethnobotany into biology teaching. Purposive sampling, as described by Merriam and Tisdell (2016), involves the intentional selection of participants who possess specific characteristics or experiences relevant to the research objectives. In this study, such participants were biology teachers with direct experience in teaching plant-related topics and a potential familiarity with indigenous plant knowledge. Maximum variation sampling, on the other hand, ensured that the selected teachers represented different school environments, thus enhancing the transferability and depth of the findings.

The sampling process followed several systematic steps to ensure credibility, ethical compliance, and representativeness across various teaching settings.

The first step involved obtaining the necessary permission and access to conduct the research. The relevant university ethics committee, confirming that the study met all institutional and professional ethical standards, initially granted ethical clearance. Following this, formal approval was sought and obtained from the Provincial Education Directorate and the Mbire District Schools Inspectorate under the Ministry of Primary and Secondary Education. This step was crucial for gaining institutional legitimacy and ensuring cooperation from school administrators and teachers. The approval process also demonstrated respect for the hierarchical structures governing educational research in Zimbabwe, thereby fostering trust and transparency between the researcher and education authorities.

The second step focused on school selection. In consultation with the Mbire District Education Office, ten secondary schools were carefully selected to ensure a balanced representation of different school types and geographic locations. The final sample included a mix of mission boarding school, rural secondary schools, and peri-urban schools. This deliberate variation allowed the researcher to explore how factors such as school ownership, size, resource availability, and community setting might influence teachers' experiences with ethnobotany integration. For instance, rural schools were expected to offer insights into how proximity to indigenous communities facilitates the use of local plant knowledge, while mission and peri- urban schools could provide contrasting perspectives shaped by formalized curricula and structured teaching approaches.

The third step involved the selection of individual teachers within each of the chosen schools. The researcher identified biology teachers who met three specific inclusion criteria:
(a) They had a minimum of two years of teaching experience. This ensure that they possessed adequate classroom exposure and familiarity with the biology syllabus;
(b) They were currently teaching plant-related units, such as ecology, plant physiology, or taxonomy, where ethnobotanical content could be most relevant; and
(c) They expressed willingness to participate in the study after being informed about its objectives, procedures, and ethical considerations.

Teachers who met these criteria were invited to participate voluntarily. This approach respected ethical principles of autonomy and consent while ensuring that the participants had sufficient experience to provide informed, reflective, and contextually grounded responses.

The final step of the sampling process involved refining the participant pool to achieve both diversity and balance. From the group of willing participants in each school, two biology teachers were purposively selected. The researcher considered gender balance to ensure that both male and female teachers were represented, acknowledging that gender may influence teaching experiences and perspectives on cultural knowledge systems. Additionally, variation in teaching experience was deliberately sought by including both junior and senior teachers. This diversity allowed the study to capture generational differences in attitudes toward indigenous knowledge integration where more experienced teachers might rely on traditional teaching methods, and younger teachers might exhibit openness to curriculum innovation.

This multi-step sampling procedure guaranteed that participants possessed the professional experience and contextual awareness necessary to provide insightful reflections on ethnobotany integration. It also ensured that the study encompassed a range of institutional conditions, pedagogical practices, and community influences that shape biology education in Zimbabwean secondary schools. The resulting sample of fifteen teachers drawn from ten schools thus represented a balanced cross-section of the teaching population in the district, offering both depth of understanding through detailed interviews and breadth of perspective through institutional diversity.

In essence, this sampling procedure aligned with the constructivist-interpretivist paradigm guiding the study, which prioritizes the exploration of subjective experiences and meaning-making processes over numerical representation. By selecting information-rich participants across a range of contexts, the study ensured that its findings would be comprehensive, credible, and reflective of the multifaceted realities faced by teachers in implementing ethnobotany in the biology curriculum (Merriam & Tisdell, 2016; Creswell & Poth, 2018).

3.6. Data Collection Instruments, Procedure, and Analysis

3.6.1. Data Collection Instruments

Semi-structured interviews were employed as a key qualitative data collection method in this study. The main purpose of these interviews was to elicit in-depth and individualized insights into teachers' perceptions, beliefs, and lived experiences regarding the integration of ethnobotany in biology teaching. This method was chosen because it allows for flexibility in questioning, enabling the researcher to probe deeper into participants' responses while maintaining focus on the study's key themes. According to Creswell and Poth (2018), semi-structured interviews are particularly suitable for qualitative studies situated within the constructivist-interpretivist paradigm, as they enable participants to express their views freely in their own words and provide rich, contextualized data that reflect their realities.

Each of the fifteen selected biology teachers participated in an individual interview. These teachers were purposively chosen based on their teaching experience, involvement in biology instruction, and their potential exposure to ethnobotanical knowledge. This selection ensured a range of perspectives from diverse school contexts, including rural, mission, and peri-urban settings. The interviews were conducted face-to-face at each teacher's school to create a familiar and comfortable environment that encouraged open communication. Each interview

lasted approximately 45 to 60 minutes and was audio-recorded with the participant's consent. In addition to audio recordings, field notes were taken to capture non-verbal cues, contextual details, and the interview environment. Interviews were conducted in English or the participant's preferred local language, and translation assistance was provided where necessary to ensure clarity and accuracy of meaning.

The interview guide consisted of four main questions aligned with the research objectives. The first question sought to understand how teachers perceive the inclusion of ethnobotany in the secondary school curriculum. This question explored teachers' conceptualizations of ethnobotany, their understanding of its relevance to biology education, and whether they view it as legitimate scientific knowledge or supplementary cultural material. Follow-up questions encouraged teachers to elaborate on which topics in the biology syllabus they believed could integrate ethnobotanical concepts and whether any formal policy guidance existed to support such inclusion.

The second question focused on identifying the perceived benefits of integrating ethnobotany into teaching and learning. Teachers were asked to describe the advantages they associated with such integration, including potential effects on learner engagement, community relevance, and the preservation of indigenous knowledge. Probing questions further explored how ethnobotany might enhance understanding of biological concepts, improve learner motivation, and strengthen school-community relationships. This question helped reveal the pedagogical and cultural value teachers attribute to the inclusion of local plant knowledge in classroom instruction.

The third question examined the challenges teachers face in integrating ethnobotany into their classroom practice. This section of the interview aimed to uncover barriers such as inadequate resources, limited training, time constraints, and a lack of curriculum support. It also explored ethical and cultural sensitivities, such as the potential misuse of sacred or confidential indigenous knowledge. Teachers were asked to share examples of obstacles they had encountered and how they addressed them. Their responses were critical in identifying the systemic and contextual factors that hinder effective implementation of ethnobotanical content.

The fourth question sought teachers' suggestions on strategies that could support the effective integration of ethnobotany into the secondary school curriculum. Teachers were invited to

propose practical solutions and recommendations for enhancing teacher training, developing instructional materials, and fostering collaboration between schools and local communities. Their ideas were expected to inform policy and practice by highlighting feasible interventions grounded in teachers' everyday experiences.

The semi-structured interview process was conducted using active listening and non-leading probing techniques. The researcher encouraged teachers to provide detailed examples and stories from their classroom practice to illustrate their points. This approach ensured that the data collected were rich and grounded in real teaching experiences. To enhance the trustworthiness of the data, the interview guide was piloted with three biology teachers outside the main study to ensure the clarity and relevance of the questions. Adjustments were made based on their feedback before the actual data collection commenced.

Ethical considerations were strictly observed throughout the interview process. Participants provided informed consent before taking part in the interviews, and confidentiality was assured by using pseudonyms and removing identifiable information from transcripts. Teachers were reminded that participation was voluntary and that they could withdraw at any time without any consequences. Sensitivity to cultural norms and respect for indigenous knowledge were maintained at all times. Participants were also advised to avoid disclosing sacred or restricted knowledge, and such information, if mentioned, was treated with utmost care and excluded from public reporting.

Data from the interviews were transcribed verbatim and translated where necessary. The researcher familiarized herself with the data through repeated reading of the transcripts before commencing coding. Thematic analysis was employed to identify recurring patterns and themes that reflected teachers' perceptions, benefits, challenges, and proposed strategies regarding ethnobotany integration. Codes were developed inductively and refined through iterative comparison across interviews. Major themes were then synthesized to provide a coherent understanding of the participants' perspectives. To ensure the credibility of the findings, techniques such as member checking, peer debriefing, and triangulation with data from focus group discussions and document analysis were applied.

Overall, the use of semi-structured interviews provided a deep and nuanced understanding of teachers' views on integrating ethnobotany into biology teaching. This method allowed teachers to express their thoughts authentically, offering valuable insights into the contextual

realities of teaching in Zimbabwean secondary schools. The rich qualitative data obtained contributed significantly to addressing the study's research objectives and offered practical implications for curriculum development, teacher education, and policy enhancement.

3.6.2. Data Collection Procedure

The data collection process followed a structured and ethical procedure. Ethical clearance was first obtained from the relevant university ethics committee, followed by permission from the Ministry of Primary and Secondary Education and individual school authorities. Teachers were purposively selected to participate, based on their teaching experience, familiarity with ethnobotany, and willingness to engage with the study. Maximum variation sampling was employed to ensure representation from diverse school types, including urban and rural schools, as well as government and private institutions.

Interviews were scheduled at times convenient for participants and lasted approximately forty-five to sixty minutes. With participants' consent, all interviews were audio-recorded to ensure accuracy, and detailed field notes were taken to capture non-verbal cues and contextual information. Ethical principles, including voluntary participation, informed consent, confidentiality, and the right to withdraw, were strictly observed throughout the data collection process.

3.6.3. Data Analysis.

Data analysis was conducted using a thematic analysis approach, which is widely used in qualitative research to identify patterns and meanings within textual data (Braun & Clarke, 2006). The audio-recorded interviews were transcribed verbatim, and the researcher immersed in the data by reading and re-reading the transcripts to gain a comprehensive understanding. Inductive coding was then applied, assigning labels to segments of text to capture their content and meaning. Both descriptive and interpretive codes were developed to reflect explicit statements as well as underlying perspectives.

Codes were subsequently grouped into broader categories to develop themes that addressed the research questions, including teachers' perceptions of ethnobotany, perceived benefits, challenges, pedagogical strategies, and resource needs. Triangulation was achieved by comparing themes derived from interviews which enhanced the credibility and

trustworthiness of the findings. Finally, the identified themes were interpreted in relation to the study's conceptual and theoretical frameworks, linking teachers' views to the broader context of curriculum integration, culturally relevant pedagogy, and the decolonisation of science education.

3.7. Data Trustworthiness

In qualitative research, ensuring trustworthiness is critical to validate the credibility, dependability, confirmability, and transferability of the findings (Lincoln & Guba, 1985). This study employed several strategies to enhance trustworthiness.

Credibility was achieved through prolonged engagement with participants, allowing the researcher to develop an in-depth understanding of teachers' views on integrating ethnobotany. Triangulation of data sources including semi-structured interviews, strengthened credibility by enabling the comparison of findings across multiple perspectives (Creswell & Poth, 2018). Member checking was also conducted, where participants were given summaries of the findings to confirm that their perspectives had been accurately captured.

Dependability was ensured through a detailed audit trail documenting the research process, including the development of data collection instruments, sampling procedures, data coding, and theme generation. This transparency allows other researchers to follow the study's methodological steps and assess the consistency of the findings.

Confirmability was maintained by the use of reflexive journaling, where the researcher recorded personal assumptions, biases, and reflections throughout the study. This practice helped to ensure that interpretations and conclusions were grounded in participants' responses rather than the researcher's subjective opinions (Merriam & Tisdell, 2016).

Transferability was facilitated by providing rich, thick descriptions of the research context, participants, and findings. Detailed contextual information enables readers to determine the extent to which the findings may be applicable to other similar educational settings, both within Zimbabwe and in other comparable contexts (Lincoln & Guba, 1985).

3.8. Ethical Considerations

Ethical principles were central to the conduct of this study to protect participants' rights and ensure integrity in research. Ethical clearance was first obtained from the relevant university ethics committee, and formal permission was secured from the Ministry of Primary and Secondary Education and participating school authorities.

Informed consent was obtained from all participants, who were provided with clear information about the study's purpose, procedures, and potential benefits and risks. Participation was voluntary, and teachers were informed of their right to withdraw at any stage without any negative consequences.

Confidentiality and anonymity were maintained by assigning codes to participants and schools, ensuring that no identifiable information appeared in the data or the final report. All data, including audio recordings, transcripts, and field notes, were securely stored and accessible only to the researcher.

Additionally, cultural sensitivity was observed when discussing ethnobotanical knowledge, particularly given that some information may be considered traditional or sacred. Participants were reminded that only knowledge they were comfortable sharing would be included in the study, and ethical respect for community knowledge was prioritized throughout data collection and analysis.

By implementing these measures, the study upheld high ethical standards and ensured that the data collected were trustworthy, credible, and reflective of participants' authentic perspectives.

CHAPTER 4 FINDINGS, INTERPRETATION AND DISCUSSION OF DATA

4.0. INTRODUCTION

Chapter 3 described the research design and methodology used in the study. A qualitative research approach was employed towards the views of teachers towards integrating ethnobotany into Zimbabwean Secondary schools. The present Chapter presents the data and findings of the study. The study was guided by the following research questions, which

sought to explore the views of teachers towards integrating ethnobotany into Zimbabwean Secondary schools.

1. How do teachers perceive the inclusion of ethnobotany in the secondary school curriculum?
2. What are the perceived benefits of integrating ethnobotany into teaching and learning?
3. What challenges do teachers encounter in integrating ethnobotany into their classroom practice?
4. What strategies can support the effective integration of ethnobotany in secondary schools?

The 15 teachers from primary schools participated in the study. The 15 teachers were subjected to interviews. For ethical reasons, research participants were identified by pseudonyms (Creswell & Plano Clark, 2011).

Table 4.1: below shows the demographic data for the participating teachers.

Table 4.1 : Demographic data for participating teachers.

Participant	Sex	Qualifications	Experience (years)
T1	F	DIPED	14
T2	M	DIPED	26
T3	M	DIPED	19
T4	F	DIPED, BED	23
T5	F	CE	33
T6	F	DIPED	19
T7	F	DIPED	14
T8	M	CE	37
T9	F	DIPED	21
T10	M	CE, BED	35
T11	F	DIPED	13
T12	F	DIPED	16
T13	F	DIPED	14
T14	M	DIPED	22
T15	M	DIPED, BED	17

Key: BED: Bachelor of Education. DipEd: Diploma in Education. CE: Certificate in Education.

Table 4.1 above shows that all the participating teachers had a minimum qualification of at least a certificate in education, and at least ten years teaching experience. This shows that participating teachers sampled had experience with the integrating ethnobotany into Zimbabwean Secondary schools. The table also shows the pseudonym of the participating teachers who were sampled from schools in the district council schools. A qualitative sample should be diverse within the confines of the defined population (Sutton & Austin, 2015).

4.1. Explore teachers' perceptions of integrating ethnobotany into secondary school curricula

This research question was guided by theme and sub themes to facilitate the interview of participating teachers.

Theme: Teachers' Perceptions of Ethnobotany Integration in Secondary School Biology

Teachers' perceptions reflect their understanding, familiarity, attitudes, and experiences with integrating ethnobotany into biology teaching. Their responses reveal how they conceptualise ethnobotany, its relevance, the practicality of using it in classrooms, and the institutional environment that either supports or hinders such integration. The analysis of responses led to the emergence of several sub-themes that reflect teachers' perceptions of ethnobotany integration in secondary school biology.

Subthemes

Conceptual Understanding of Ethnobotany

When participating teachers were asked their conceptual understanding of integration of ethnobotany in secondary school biology, some of the verbatim responses from the participating teachers of the sub questions asked are given below.

T1 verbalised: "Ethnobotany is the study of how people use plants in their daily lives, especially for medicine and food."

T12, replied: "It is knowledge about plants that comes from local communities."

T7 said: "I understand it as the relationship between people and indigenous plants."

Familiarity and Exposure to Indigenous Plant Knowledge

When participating teachers where asked about their familiarity and exposure to indigenous plant knowledge, some of the verbatim responses are as follows:

T2 responded: "I am fairly familiar because I grew up in a rural community where we used medicinal plants."
T8 noted: "I only know a few common examples like aloe or Moringa; otherwise, I am not very informed."
T6 adduced: "I have limited exposure; this was not covered in detail during teacher training."

Classroom Practices: Use of Ethnobotanical Examples

Teachers were also asked about the use of ethnobotanical examples during in the biology lesson. There following are some of the verbatim responses:

T10 professed: "Yes, I sometimes include examples when teaching topics like classification, plant adaptations, or medicinal plants."
T15 adduced: "I rarely include such examples because I am not confident in the information."
T13 stated "No, I have never included ethnobotany in my lessons; it is not explicitly in the syllabus."

Perceived Relevance to the Biology Syllabus

Another sub question was on the perceived relevance to the biology syllabus. Some verbatim responses were as follows:

T5 remarked: "It is very relevant because the syllabus emphasises applications of biology in real life."

T11 declared: "Ethnobotany supports the new curriculum's thrust on heritage studies and local context."
T9 noted: "It seems relevant, but the syllabus does not provide clear guidance."
T3 stated: "I'm not sure it aligns; the curriculum is more science-oriented."

Learner Engagement and Responses

When asked about learner engagement and responses during the integration of ethnobotany in the biology lesson, the following were some of the verbatim responses:

T8 responded: "Learners become more excited and engaged when I mention local plants they know."
T1 professed: "Some students participate actively because they bring their own family knowledge."
T12 said: "Others show little interest, saying such knowledge is old-fashioned."
T14 declared: "Urban learners sometimes struggle to relate since they lack rural exposure."

Alignment with Modern Scientific Knowledge

Another sub question was on the alignment of ethnobotany with modern scientific knowledge. Some verbatim responses were as follows:

T10 replied: "*Yes, ethnobotany aligns well because many modern medicines originate from plants used traditionally."*
T4 remarked: "There is alignment, but indigenous knowledge must be scientifically validated."
T6 adduced: "Some aspects align, but others contradict what is taught as scientific principles."
T9 professed: "I am unsure; I think they can complement each other if taught carefully."

Attitudes Toward Teaching Indigenous Knowledge Systems (IKS)

When the participating teachers were asked their attitudes toward teaching indigenous knowledge systems, some of the verbatim responses are below:

T2 said: "I am positive about integrating IKS because it promotes cultural pride and contextual learning."
T5 responded: "I support it but feel I need more training."
T7 stated: "I am neutral; I will include it only if required by the syllabus."
T3 replied: "I am hesitant because I worry about accuracy and scientific credibility."

School Administration and Curriculum Policy Support

When participating teachers were asked about school administration and curriculum policy support, the following are some of the verbatim responses:

T9 noted: "The administration encourages contextualised teaching, including indigenous knowledge."
T1 adduced: "There is no explicit policy, but the school is open to innovative teaching approaches."
T5 said: "We lack resources and support from administration to incorporate local plant knowledge."
T15 replied: "Curriculum policy mentions heritage-based education, but practical support is limited."

Summary

Teachers exhibit diverse perceptions of integrating ethnobotany into secondary school biology. Their conceptual understanding ranges from basic awareness of indigenous plant uses to more detailed interpretations of ethnobotany's cultural and scientific relevance. Familiarity varies and is often linked to personal background or exposure. While some teachers already use ethnobotanical examples, mainly in topics such as classification or plant adaptations, others refrain due to lack of confidence or syllabus clarity.

Teachers generally perceive ethnobotany as relevant to contextualised and heritage-based learning. Learner responses are mostly positive, though influenced by cultural and geographical context. Many teachers recognise potential alignment between ethnobotany and scientific knowledge, though concerns about accuracy and validation persist. Attitudes toward IKS range from supportive to cautious, often mediated by teacher training and curriculum demands. Institutional support is inconsistent, with some schools encouraging integration and others offering little direction.

Overall, the responses indicate that while ethnobotany has promising potential within biology education, successful integration requires teacher training, clearer curriculum guidance, and administrative support.

4.2. Examine the perceived benefits of ethnobotany integration in the teaching and learning process

This research question was guided by the theme and sub theme, reflecting a range of practical and realistic perspectives of participating teachers.

Theme: Perceived Benefits of Integrating Ethnobotany into Teaching and Learning

This theme explores the advantages teachers believe arise from including ethnobotanical knowledge in the secondary school biology curriculum. It reflects teachers' insights on pedagogical value, cultural preservation, learner motivation, community partnerships, environmental awareness, and long-term developmental outcomes.

Subthemes.

Improving Understanding of Biological Concepts

When participating teachers where asked if ethnobotany improves understanding of biological concepts, some of the verbatim responses are as follows:

T11 verbalised: "It helps learners grasp concepts like classification, plant physiology, and adaptation by using familiar examples."
T7 said: "Students understand faster when local plants are used to illustrate abstract ideas."
T2 declared "It connects theory to practice and strengthens conceptual clarity."

Making Biology Relevant to Daily Life

The participating teachers were asked if ethnobotany makes biology relevant to daily life and the following are some of the verbatim responses:

T13 responded: "Learners see how biology applies to food, medicine, and survival strategies in their own communities."
T4 opined: "It shows that science isn't separate from their everyday experiences."
T5 replied: It helps students value the biology behind practices already happening at home."

Preserving Local Cultural Knowledge

When participating teachers were asked if ethnobotany preserve local cultural knowledge, the following are some of the verbatim responses:

T6 stated: "Yes, it keeps indigenous plant knowledge alive for younger generations."
T14 professed: "Learners get exposed to cultural traditions that might otherwise be forgotten."
T3 verbalised: "It builds cultural pride and appreciation for community wisdom."

Increasing Motivation and Participation

When participating teachers were asked if ethnobotany increases motivation and participation of learners, the following are some of the verbatim responses:

T15 remarked: "*Learners become more engaged when lessons include what they already know."*
T7 noted: "It encourages participation because students can share their own experiences."

T13 declared: "Practical activities like plant identification make learning exciting."

Enhancing School–Community Collaboration

Asked about if ethnobotany enhance school-community collaboration, the following are some of the verbatim responses:

T2 responded: "Ethnobotany encourages schools to work with elders and traditional healers."
T5 adduced: "It opens opportunities for fieldwork in local environments."
T7 verbalised: "Community members can contribute expertise, making learning richer."

Promoting Environmental Awareness and Conservation

When participating teachers were asked if ethnobotany promote environmental awareness and conservation, the following are some of the verbatim responses:

T10 remarked; "Students learn the importance of conserving medicinal plants and local biodiversity."
T4 replied: "It encourages sustainable harvesting and respect for ecosystems."
T14 noted: "Learners understand ecological roles of plants and threats like deforestation."

Long-term Benefits for Students or Communities

Asked about if ethnobotany have long-term benefits for students or communities, the following are some of the verbatim responses:

T8 noted: "Students can develop careers in botany, herbal medicine, or environmental science."
T12: "Communities benefit from conservation-minded youth."
T3 replied: "It supports sustainable development and responsible resource use."

Contribution to Education for Sustainable Development (ESD)

When participating teachers were asked if ethnobotany contribute to education for sustainable development, the following are some of the verbatim responses:

T11 stated: "Ethnobotany teaches sustainable living practices rooted in local culture."
T2 remarked: "It promotes critical thinking about environmental stewardship and resource management."
T6 replied: "It aligns with ESD goals by linking cultural heritage, ecology, and science."

Summary

Teachers identify multiple benefits of integrating ethnobotany into biology teaching, highlighting its value in enhancing comprehension, relevance, and learner engagement. They believe that using familiar plant examples helps students understand scientific concepts more easily and fosters a stronger connection between classroom learning and everyday life. Many teachers appreciate ethnobotany's role in safeguarding cultural heritage, promoting pride in indigenous practices, and encouraging intergenerational knowledge transfer.

Additionally, teachers perceive ethnobotany as a catalyst for active learning and improved participation, particularly when students contribute their personal experiences. They also view it as a powerful bridge between schools and local communities, creating opportunities for collaboration and shared learning. Environmental awareness emerges as a key benefit, with teachers noting that ethnobotanical knowledge nurtures respect for biodiversity and promotes sustainable practices. In the long run, teachers foresee advantages such as increased community resilience, enhanced cultural continuity, and alignment with global educational frameworks like Education for Sustainable Development.

Together, these insights illuminate how ethnobotany can serve as a transformative component of the biology curriculum, enriching both scientific understanding and cultural identity.

4.3. Identify challenges faced by teachers in integrating ethnobotanical knowledge into classroom practice.

Theme: Challenges in Integrating Ethnobotany in Biology Teaching

This theme explores the constraints, limitations, and practical difficulties teachers face when attempting to integrate ethnobotany into secondary school biology lessons. It highlights issues related to resources, teacher preparedness, curriculum design, institutional support, cultural sensitivities, and systemic barriers.

Subthemes.

Inadequate Teaching and Learning Materials

When participating teachers were asked the availability of teaching and learning materials, the following are some of the verbatim responses:

T1 said: "There are very few textbooks or guides that include ethnobotanical content."
T7 declared: "Most resources focus strictly on Western scientific knowledge."
T10 professed: "I have to rely on personal knowledge or ask community members since the materials are limited."

Lack of Formal Training on Integrating Indigenous Knowledge

When participating teachers were asked about if they receive formal training on integrating indigenous knowledge, the following are some of the verbatim responses:

T13 remarked: "I have never been trained on how to teach using indigenous knowledge systems."
T5 noted: "Workshops on integrating IKS are rare or non-existent."
T8 adduced: "Without training, I am unsure how to align ethnobotany with scientific topics."

Limited Curriculum Support in the Biology Syllabus

Asked about the availability of curriculum support in the biology syllabus, the following are some of the verbatim responses:

T14 noted: "The syllabus does not clearly mention ethnobotany, so it is difficult to justify its inclusion."
T7 professed: "There is some room in topics like ecology or classification, but guidance is minimal."

T9 declared: "Examination-focused teaching limits flexibility."

Time Constraints and Syllabus Coverage Pressures

When participating teachers were asked about time constraints and syllabus coverage pressures, the following are some of the verbatim responses:

T4 responded: "There is too much content to cover, so adding ethnobotany becomes time-consuming."
T9 replied: "The workload makes it difficult to introduce additional examples."
T4 said: "We rush through the syllabus, leaving no room for extended discussions."

Limited Teacher Confidence in Ethnobotanical Knowledge

Asked about the teacher confidence in ethnobotanical knowledge, the following are some of the verbatim responses:

T14 said: "I don't feel knowledgeable enough about local plant uses."

T2 adduced: "Much of the knowledge is community-based and I fear giving inaccurate information."
T6 replied: "I am confident in biology but not in ethnobotany."

Cultural and Ethical Sensitivities

When participating teachers were asked about cultural and ethical sensitives of ethnobotany, the following are some of the verbatim responses:

T1 declared: "Some plant uses involve traditional beliefs that may be controversial."
T9 verbalised: "Parents might object to certain discussions, especially those linked to spiritual practices."
T14 opined: "Learners from different cultural backgrounds may interpret the content differently."

Limited Administrative and Supervisory Support

Further, when asked about the administrative and supervisory support, the following are some of the verbatim responses:

T15 replied: "Administrators rarely encourage IKS integration."
T7 adduced: "There is no formal school policy guiding ethnobotany."
T10 stated: "Curriculum supervisors focus only on exam-related content."

Systemic and Institutional Barriers

Asked about the systemic and institutional barriers, the following are some of the verbatim responses:

T3 verbalised: "There are no national guidelines on teaching ethnobotany."
T12 declared: "Professional development programs on IKS are unavailable."
T7 remarked: "The education system prioritises Western science, making integration difficult."

Summary

Teachers face a wide range of challenges in integrating ethnobotany into secondary school biology, reflecting both practical and systemic constraints. Many struggle with the lack of teaching resources and the absence of formal training that would build their competence and confidence in teaching indigenous knowledge. The biology syllabus, often dominated by examinable scientific content, provides limited space or direction for ethnobotanical inclusion. Time pressures further restrict the opportunity to explore additional cultural and botanical contexts.

Cultural and ethical sensitivities add another layer of complexity, requiring teachers to navigate diverse beliefs and potential controversies carefully. Institutional and supervisory support is often insufficient, leaving teachers without policy guidance or encouragement. At a broader level, systemic barriers such as limited professional development, rigid curriculum structures, and the dominance of Western scientific frameworks further constrain the meaningful integration of ethnobotany.

Overall, these challenges indicate the need for curriculum reform, increased training, resource development, and supportive institutional policies to promote effective and contextually relevant biology education.

4.4. Suggest strategies to enhance the effective inclusion of ethnobotany in the Zimbabwean secondary school curriculum

Theme: Strategies to Enhance the Integration of Ethnobotany into the Secondary School Curriculum

This theme explores teachers' suggestions on how the teaching and learning of ethnobotany can be strengthened within the secondary school biology curriculum. It focuses on the types of support, training, resources, collaborations, and policy interventions that teachers believe are necessary for effective and sustainable curriculum integration.

Subthemes

Teacher Training and Professional Development

When participating teachers were asked about teacher training and professional development, the following are some of the verbatim responses:

T5 said: "We need workshops specifically focused on ethnobotany and how to teach it."
T11Stated: "Training should cover both the botanical content and cultural aspects."
T6 replied: "Professional development should include fieldwork to identify local plants."
T14 responded: "Teacher colleges should introduce modules on indigenous knowledge systems."

Curriculum Support from Developers and Policymakers

Asked about the curriculum support from developers and policymakers, the following are some of the verbatim responses:

T4 noted: "The curriculum should explicitly state where ethnobotany fits in each topic."
T1 replied: "Policymakers must provide clear guidelines and examples for teachers."
T3 professed: "More support documents are needed to show learning outcomes related to IKS."
T13 remarked: "The Ministry should include ethnobotany in syllabus reviews and examinations."

Development of Teaching Resources and Materials

When participating teachers were asked about the development of teaching resources and materials, the following are some of the verbatim responses:

T15 remarked: "Textbooks must include local plant examples and cultural uses."
T2 declared: "We need posters, charts, and digital resources illustrating ethnobotanical practices."
T4 replied: "A resource handbook on indigenous plants would help a lot."
T1noted: "Case studies from local communities should be added to teaching materials."

Involvement of Local Communities and Elders

When participating teachers were asked about the involvement of local communities and elders, the following are some of the verbatim responses:

T13 stated: "Elders can be invited to demonstrate traditional plant uses."
T8 remarked: "Field trips to local communities or herbal gardens would enrich learning."
T12 professed: "Schools should partner with traditional healers, herbalists, and cultural experts."
T4 noted: "Community knowledge can make biology more meaningful and authentic."

Collaboration Among Teachers

Asked about the collaboration among teachers, the following are some of the verbatim responses:

T9 replied: "Cluster workshops would help teachers share approaches and examples."
T4 remarked: "Peer learning groups can develop lesson plans with ethnobotanical content."
T3 declared: "Teacher collaboration would reduce the workload and build confidence."
T6 opined: "Inter-school projects on indigenous plants could motivate teachers."

Role of Universities and Teacher Training Colleges

When participating teachers were asked about the role of universities and teacher training colleges in inclusion of ethnobotany in schools, the following are some of the verbatim responses:

T5 said: "Universities should conduct research on local plant knowledge and share findings with schools."

T3 adduced: "Teacher colleges must integrate ethnobotany into their biology methods courses."
T7 declared: "Academics could host public lectures or seminars for teachers."
T12 verbalised: "Universities can help develop reliable teaching materials."

Adapting Assessment Methods

When participating teachers were asked about adapting assessment methods, the following are some of the verbatim responses:

T1 responded: "Assessments should include project-based tasks on local plants."
T15 said: "Exams must include questions that value indigenous knowledge."
T11 replied: "Practical tests can incorporate plant identification or cultural uses."
T7 verbalised: "Continuous assessment may allow integration of community-based tasks."

Policies and Long-Term Initiatives to Sustain Integration

Further, asked about the policies and long-term initiatives to sustain integration, the following are some of the verbatim responses:

T2 professed: "Government should create policies mandating the inclusion of IKS in STEM subjects."
T15 declared: "Funding should be allocated for resource development and teacher training."
T10 remarked: "Schools need long-term programmes such as herbal gardens or ethnobotany clubs."
T5 said: "National initiatives linking biology to heritage studies can strengthen integration."

Summary

Teachers propose a wide range of strategies to enhance the integration of ethnobotany into the secondary school curriculum, emphasising the need for systematic support at multiple levels. Key suggestions include targeted teacher training to build confidence and competence, stronger curriculum guidance from policymakers, and the development of comprehensive teaching materials that incorporate local plant knowledge. Teachers also highlight the importance of community involvement, collaboration among educators, and the role of universities in providing research-based support.

Furthermore, teachers believe that assessment methods should be adapted to accommodate indigenous knowledge content, thereby giving ethnobotany formal academic legitimacy. They also call for long-term policies and initiatives that embed ethnobotany into educational practice sustainably. Collectively, these strategies reflect a holistic approach aimed at strengthening the visibility, relevance, and effectiveness of ethnobotany within biology education.

4.5. Discussion

4.5.1. Teachers' Perceptions of Integrating Ethnobotany.

Findings from this study reveal that teachers generally view ethnobotany as a potentially valuable component of secondary school biology education, but their perceptions are shaped by a complex interplay of understanding, familiarity, confidence, curriculum expectations, and institutional support. This aligns closely with existing literature that positions teachers as key mediators between curriculum policy and classroom practice (Chingombe et al., 2023; Oyetoro & Babarinde, 2021). In this study, teachers demonstrated varying degrees of conceptual clarity regarding ethnobotany. While several described it as the study of relationships between people and plants or the traditional uses of indigenous flora, others displayed limited understanding, indicating that ethnobotany remains a relatively unfamiliar domain within formal teacher training. This echoes Ahanonye et al. (2024), who found that many in-service teachers lack foundational knowledge in ethnobotany and related cultural ecological frameworks.

Teachers' familiarity with indigenous plant knowledge often stemmed from personal or community experiences rather than professional training. Respondents who grew up in rural environments or who had cultural exposure to traditional plant use felt more confident discussing ethnobotanical concepts with learners. Those without such backgrounds expressed uncertainty about the accuracy of the information they might share. This uncertainty reflects broader concerns in the literature regarding teacher preparedness and confidence in culturally grounded science content (Ahanonye et al., 2024; Lestari, 2024). Teachers with higher levels of confidence—particularly those who could relate indigenous plant uses to scientific principles—were more inclined to incorporate ethnobotany into topics such as classification, ecology, and human physiology. This pattern is consistent with findings by Mavuru and

Ramnarain (2021), who argue that teacher confidence significantly influences willingness to integrate indigenous knowledge into science lessons.

Participants widely perceived ethnobotany as relevant to the biology curriculum, especially in making learning more meaningful and contextually grounded for learners. Teachers noted that learners responded enthusiastically when lessons included familiar plants or cultural practices, a finding supported by Gutiérrez-García (2024), who observed increased learner motivation and plant awareness in programmes that integrate local plant knowledge. This study's respondents highlighted that contextual examples helped bridge the gap between abstract scientific concepts and students' lived experiences, making biology more accessible and relatable. Such observations reinforce the argument by Chingombe et al. (2023) and Oyetoro and Babarinde (2021) that ethnobotany enhances engagement and promotes deeper conceptual understanding.

In addition to enhancing subject relevance, teachers perceived ethnobotany as valuable for interdisciplinary learning. Many highlighted that ethnobotanical content naturally intersects with cultural studies, environmental science, and health education—an observation aligned with Mavuru and Ramnarain's (2021) assertion that ethnobotany supports holistic curriculum integration. Teachers argued that understanding local plant uses can promote environmental stewardship and cultural appreciation among learners, echoing research suggesting that ethnobotany-based inquiry promotes ecological literacy (Lestari, 2024).

Despite these positive perceptions, teachers also revealed reservations connected to curriculum structure, assessment demands, and systemic constraints. Several noted that although ethnobotany aligns well with curriculum goals such as promoting local relevance and heritage, the syllabus does not explicitly outline how or where to integrate such content. This mirrors findings by da Silva (2024), who argues that rigid, examination-driven curricula often limit teacher autonomy in introducing contextual knowledge. Teachers in the current study frequently expressed concern that integrating ethnobotany might detract from time allocated to examinable content, reinforcing Arif's (2025) assertion that systemic pressures can suppress innovative teaching even when perceptions are favourable.

Ethical and cultural considerations also influenced teachers' attitudes. Some respondents worried about misrepresenting indigenous knowledge or addressing culturally sensitive practices, particularly relating to medicinal plants. Such concerns reflect Arif's (2025)

argument that teachers face ethical challenges when integrating local knowledge without clear frameworks for consent, attribution, or cultural sensitivity. This aligns with calls in the literature for participatory curriculum design involving community knowledge holders to avoid DE contextualization and promote respectful integration (da Silva, 2024; Compan et al., 2025).

Another significant finding relates to the availability of teaching resources. Teachers noted a lack of structured ethnobotanical materials such as plant guides, local herbarium samples, or contextual lesson plans—constraints widely documented in the literature (Arif, 2025; Compan et al., 2025). The absence of these resources heightened the perceived difficulty of incorporating ethnobotany and increased reliance on teachers' personal knowledge, thereby reinforcing disparities depending on individuals' prior exposure.

Overall, the findings from this study mirror broader scholarly consensus that teachers hold generally positive perceptions of ethnobotany's value but require institutional, pedagogical, and curricular supports for its effective integration (Ahanonye et al., 2024; Gutiérrez-García, 2024; Rinto, 2023). As Arif (2025) and Lestari (2024) suggest, when training, resources, and community partnerships are available, teachers' confidence and willingness to integrate ethnobotany increase substantially.

In summary, teachers in this study view ethnobotany as an enriching and culturally meaningful **dimension of biology education, capable of enhancing learner engagement, contextual** understanding, and interdisciplinary connections. However, their perceptions are tempered by concerns about content knowledge, ethical considerations, curriculum constraints, and lack of resources. These findings align with the literature, which highlights both the transformative promise of ethnobotany and the systemic supports required to translate positive perceptions into sustained classroom practice.

4.5.2. Perceived Benefits of Integrating Ethnobotany

The findings for Research Question 2 reveal that teachers perceive multiple pedagogical, cultural, and ecological benefits associated with integrating ethnobotany into the biology classroom. These perceptions closely mirror existing literature, which consistently highlights the capacity of ethnobotany to make science learning more relevant, engaging, and grounded in learners' lived experiences. Teachers in the study indicated that when biology lessons are

connected to local plant uses, familiar landscapes, or everyday cultural practices, learners demonstrate heightened interest and stronger participation. This aligns with reports by Lestari (2024) and Compan et al. (2025), who found that ethnobotany-based lessons—such as plant identification walks, school gardening activities, or interviews with local knowledge holders—significantly improve learner engagement because they resonate with students' personal cultural contexts rather than presenting plants as abstract, textbook-based categories.

Teachers also described enhanced conceptual understanding as a key benefit, particularly in relation to botanical literacy. Participants noted that ethnobotany helps learners better recognise, name, and classify plants by grounding scientific concepts in familiar species and meaningful cultural uses. This observation is consistent with studies highlighting ethnobotany's role in combating plant blindness and reinforcing plant awareness (Lindemann-Matthies et al., 2024; Parsley et al., 2022). By embedding plant learning within real-life examples, the approach not only improves species recognition and ecological understanding but also enhances long-term retention and conceptual transfer.

Another important perceived benefit concerns the promotion of environmental consciousness. Teachers reported that ethnobotany activities, especially those involving documentation of plant uses or observation of local resource pressures, encourage learners to appreciate plants as integral to community well-being. This sense of ecological responsibility echoes findings by Compan et al. (2025) and Mercier (2025), who argue that when learners recognise plants as vital sources of medicine, food, or cultural identity, sustainable behaviours become more personally meaningful. Lestari (2024) similarly notes that such lessons nurture stewardship values that are central to environmental education and sustainable development.

Teachers also emphasised the interdisciplinary advantages of ethnobotany, observing that it naturally connects biology with local history, cultural studies, nutrition, and economics. These insights reflect broader scholarly arguments that ethnobotany serves as a mechanism for culturally responsive pedagogy by validating Indigenous knowledge systems and enabling co-teaching with community experts (Rinto, 2023; Aziz et al., 2022). Through such cross-curricular links, teachers perceived that ethnobotany accommodates diverse learner strengths and promotes deeper, more holistic learning. Lestari (2024) further supports this by illustrating how ethnobotany-driven projects, such as exploring the biology and cultural significance of a major crop, create multiple learning pathways that enhance inclusion and engagement.

In addition to conceptual and cultural benefits, teachers identified skill-building opportunities as central to ethnobotany integration. Many described ethnobotany as a platform for inquiry-based learning, where learners engage in plant identification, simple experiments, and evidence-gathering through community interviews. These perceptions resonate strongly with de Borba Antonelli et al. (2024), who document that ethnobotany naturally supports authentic scientific practices such as data collection, observation, mapping, and herbarium preparation. Lestari (2024) similarly reports that students exposed to ethnobotany inquiry models develop stronger scientific reasoning and practical competencies compared with those taught through traditional lecture methods.

Participants also highlighted the social benefits of ethnobotany, particularly its role in strengthening school–community relationships. Teachers noted that involving elders, healers, and local artisans in classroom learning fosters intergenerational knowledge transmission and positions the school as a hub for cultural preservation. These observations are supported by de Borba Antonelli et al. (2024) and Compan et al. (2025), who found that such collaborations validate learners' cultural identities, especially those from historically marginalised communities, and increase their confidence and persistence in science learning.

Taken together, the findings and literature suggest that ethnobotany integration offers a powerful mechanism for transforming plant science education into a more relevant, participatory, and community-connected learning experience. Teachers' perceptions reinforce the evidence that ethnobotany enhances learner engagement, improves botanical literacy, promotes environmental stewardship, and supports culturally responsive teaching. However, the literature also cautions that achieving these benefits requires thoughtful planning, adequate teacher preparation, and appropriate resourcing to ensure that ethnobotany activities are pedagogically sound and culturally respectful (Compan et al., 2025; Lestari, 2024).

In summary, the findings for Research Question 2 confirm that teachers perceive ethnobotany as a highly valuable pedagogical tool that supports conceptual understanding, practical scientific skills, cultural identity affirmation, and sustainable development competencies. These perceptions align strongly with existing empirical research, reinforcing the view that ethnobotany can significantly enrich secondary school biology when integrated intentionally and supported through appropriate curriculum design and professional development.

4.5.3. Challenges in Integrating Ethnobotanical Knowledge into Classroom Practice

The findings of Research Question 3 reveal that teachers encounter multiple, interrelated challenges that hinder the effective integration of ethnobotanical knowledge into secondary school biology. These challenges resonate strongly with existing scholarship, which similarly documents structural, pedagogical, material, cultural, and ethical constraints shaping teacher practice.

A consistent theme among participants was the absence of appropriate and structured teaching materials, a finding well supported by the literature. Chingombe et al. (2023) observe that teachers often lack textbooks, teaching aids, and assessment tools that explicitly align with ethnobotanical content, making it difficult for them to incorporate ethnobotany meaningfully within lessons. This lack of curriculum-aligned resources is compounded by the dominance of Western scientific paradigms in school biology, which frequently positions Indigenous and local knowledge as peripheral or inferior (Shava, 2022). Teachers in the study similarly reported concerns about the credibility of ethnobotanical knowledge when juxtaposed with conventional science curricula, reflecting broader epistemological tensions noted in previous research.

The results also highlight cultural and ethical concerns as significant barriers. Teachers expressed apprehension about intellectual property rights, cultural sensitivities, and the risk of misrepresenting or inappropriately sharing community knowledge—issues highlighted by Nyathi et al. (2022). These concerns mirror broader academic debates about the ethical complexities of integrating Indigenous knowledge into formal education and underscore teachers' fears of unintentionally breaching community protocols. This aligns with Schunko et al. (2024) and Rinto (2023), who similarly found that teachers lack clear ethical frameworks for navigating sensitive cultural knowledge, making them hesitant to engage deeply with ethnobotany in the classroom.

In agreement with Mushavikwa (2020), the findings also reveal systemic and institutional constraints, such as overcrowded classrooms, limited laboratory space, and pressure to meet examination-oriented expectations. Teachers in the current study described how these structural conditions make practical and field-based ethnobotany activities difficult to conduct. This is especially pronounced in exam-driven contexts, where curriculum pacing guides and assessment requirements tightly regulate classroom time. Consistent with Mlotshwa (2024) and da Silva (2024), teachers noted that high-stakes examinations leave little flexibility for incorporating content not explicitly examined, making ethnobotany appear

as an “add-on” rather than curricular priority. This reinforces the literature’s assertion that curriculum rigidity is a major gatekeeping factor limiting ethnobotany’s integration (Compan et al., 2025).

Another significant challenge identified by teachers is insufficient training and low confidence in ethnobotanical content knowledge. Participants frequently reported minimal exposure to ethnobotany during pre-service and in-service training, echoing Chingombe et al. (2023) and Rinto (2023), who found that lack of teacher preparation undermines the accuracy and confidence needed to teach culturally grounded plant knowledge. Teachers’ concerns about misidentifying species or inaccurately explaining plant uses align with Lestari (2024) and Parsley et al. (2022), who assert that plant education and botanical literacy remain historically weak components of biology teacher preparation. The current study’s findings reinforce the need for sustained professional development that includes plant identification, culturally responsive pedagogy, and ethical collaboration with knowledge holders.

Material and logistical constraints also emerged as prominent obstacles. Teachers cited inadequate field equipment, limited access to herbarium facilities, lack of school garden space, and insufficient funding for excursions—issues also raised in Chingombe et al. (2023) and Mlotshwa (2024). Such deficits often result in teachers reducing ethnobotany to theoretical discussions rather than engaging learners in the hands-on, inquiry-rich experiences recommended by curriculum innovators (Compan et al., 2025).

Teachers further discussed the complexities of community engagement, which, while frequently cited as a benefit of ethnobotany, also presents notable challenges. Participants reported difficulties scheduling community experts, uncertainty regarding compensation, and concerns about extracting knowledge without reciprocity—aligning with findings from de Borba Antonelli et al. (2024). The epistemic tension between scientific and local knowledge systems, as noted in Compan et al. (2025), was also reflected in teachers’ accounts, demonstrating that respectful and sustainable partnerships require institutional support that teachers often lack.

Finally, teachers identified safety and liability concerns, particularly regarding plants with medicinal or toxic properties. Participants expressed reluctance to demonstrate or discuss certain plant uses due to fears of misuse or potential harm—concerns mirrored in Lestari (2024) and Rinto (2023). The absence of clear school policies governing the handling or

discussion of traditional remedies intensifies these anxieties and sometimes leads administrators to restrict ethnobotany-related activities.

Overall, the results align closely with the literature, demonstrating that while teachers may value ethnobotany conceptually, a constellation of challenges—curricular, logistical, epistemological, ethical, and safety-related—significantly limit its classroom integration. These findings reinforce the broader conclusion that without clear policy support, structured resources, ethical guidelines, and sustained teacher training, ethnobotany is likely to remain marginal in secondary biology despite teachers' positive attitudes toward its educational potential.

4.5.4. Strategies to Enhance the Effective Inclusion of Ethnobotany in the Zimbabwean Secondary School Curriculum

The findings of the study reveal that teachers, curriculum specialists, and community stakeholders identify a constellation of interconnected strategies necessary for strengthening the inclusion of ethnobotany in the Zimbabwean secondary school curriculum. These results closely mirror emerging regional and international literature, which underscores the need for coordinated policy support, teacher development, curriculum alignment, resource provision, and community engagement to effectively integrate ethnobotanical knowledge in formal education (Compan et al., 2025; Mlotshwa, 2024; Schunko et al., 2024).

A central finding from the study is the importance of clear policy and curricular frameworks. Participants emphasized that integration efforts remain inconsistent and largely teacher-dependent because ethnobotany is not explicitly articulated within examinable syllabi. This aligns with literature showing that teachers are more willing to incorporate Indigenous knowledge when it is formally endorsed in national frameworks and accompanied by practical guidelines (da Silva, 2024; Mlotshwa, 2024). While Zimbabwe's Curriculum Framework (MoPSE, 2021) promotes contextualized learning, the study results affirm scholarly concerns that the absence of operationalized guidance limits teachers' ability to translate policy intent into classroom practice (Mutseekwa, 2021; Sunzuma et al., 2022). Thus, participants' calls for policy clarity echo broader academic recommendations for a structured national approach to Indigenous knowledge integration.

The results also highlight the significance of curriculum mapping and modular design, particularly within an exam-driven education system. Respondents noted that pressure to cover ZIMSEC-aligned content often side-lines innovative approaches. This is consistent with research showing that rigid assessment regimes limit teachers' capacity to incorporate culturally responsive material (Compan et al., 2025). The participants' proposals for structured modules integrated into topics such as ecology, biodiversity, and plant physiology are strongly supported by scholars advocating alignment of ethnobotanical content with core science outcomes (Gutiérrez-García, 2024; Lestari, 2024). These findings suggest that modular ethnobotany units could provide a pragmatic solution, enabling teachers to maintain scientific rigor while enriching learning with Indigenous plant knowledge.

Teacher-related factors also emerged strongly, with respondents stressing the need for comprehensive professional development. Many teachers reported limited knowledge of local plant uses and uncertainty about handling culturally sensitive content, concerns echoed widely in the literature (Parsley et al., 2022; Rinto, 2023). This convergence underscores the need for sustained teacher capacity-building initiatives that integrate botanical training, pedagogical strategies, and intercultural competence. The study's suggestion for a cascade model of professional development aligns with recommendations by Mutseekwa (2021) and Sunzuma et al. (2022), who argue for mentorship-based structures to ensure sustainable nationwide implementation.

Another pivotal theme emerging from the findings is the need for authentic community participation, particularly through co-design of learning activities and ethical engagement with knowledge holders. Respondents highlighted that communities possess rich ethnobotanical knowledge essential for contextual learning, yet schools often lack structured mechanisms for partnership. This finding is consistent with international calls for equitable school community collaborations to avoid misrepresentation or exploitation of Indigenous knowledge (Schunko et al., 2024; de Borba Antonelli et al., 2024). The study thus reinforces the view that community elders, healers, and farmers should become integral partners in curriculum development and teaching, in line with Zimbabwe's Heritage-Based Education philosophy (MoPSE, 2021).

In terms of instructional resources, participants identified the lack of context-relevant teaching materials including plant reference guides, fieldwork tools, and laboratory equipment as a major impediment. This aligns with literature documenting persistent resource

gaps across African education systems (Mlotshwa, 2024). The participants' proposals for locally developed plant manuals, herbarium kits, and digital tools reflect current scholarly recommendations urging ministries to collaborate with universities and botanical institutions to produce accessible and affordable resources (Compan et al., 2025). These findings suggest that strategic partnerships could significantly enhance the feasibility of ethnobotany instruction, especially in under-resourced rural schools.

Experiential learning strategies such as school gardens, field excursions, and citizen-science projects were also highly valued by respondents. These approaches, cited as effective by both research participants and current literature, enhance learners' scientific understanding and cultural appreciation simultaneously (Chingombe et al., 2023; Gutiérrez-García, 2024). Participants' positive views confirm scholarly claims that hands-on, place-based learning fosters deeper engagement with biodiversity and sustainability issues. Such approaches also align with national priorities around climate resilience and food security, further justifying their integration.

Consistent with findings from other contexts, the study revealed that assessment reform is essential for sustaining teacher motivation. Many respondents noted that teachers prioritize examinable content, making it necessary for ethnobotanical topics to be embedded within ZIMSEC structures. This is supported by research advocating performance-based and project-oriented assessment methods to capture applied learning and critical thinking (da Silva, 2024; Mlotshwa, 2024). The study thus confirms the argument that curriculum innovation must be accompanied by assessment innovation to ensure institutional uptake.

Finally, the results emphasize the necessity of multi-stakeholder collaboration and ongoing research. Respondents acknowledged that successful ethnobotany integration requires the involvement of ministries, universities, NGOs, and community knowledge holders a perspective strongly supported by literature (Sunzuma et al., 2022; Compan et al., 2025). Participants' calls for evaluation of pilot programs mirror scholarly recommendations for systematic monitoring to assess the impact of ethnobotany education on learners and communities (Chingombe et al., 2023).

Taken together, the study's findings align closely with contemporary literature, reinforcing the argument that integrating ethnobotany in Zimbabwean secondary schools requires a multi-layered, systemic approach. Policy alignment, teacher preparation, community

engagement, resource development, experiential learning, assessment reform, and stakeholder collaboration are not isolated strategies but mutually reinforcing elements necessary to establish a robust and culturally responsive ethnobotany curriculum.

CHAPTER 5 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0. INTRODUCTION

Chapter four analysed and discussed the data from a study on. This chapter summarises the key findings of the study, draws conclusions and proffers recommendations towards integrating ethnobotany into Zimbabwean Secondary schools.

5.1. SUMMARY

This research project explores the views of teachers towards integrating ethnobotany into Zimbabwean Secondary schools. The study was guided by the following research questions, which sought to explore the views of teachers towards integrating ethnobotany into Zimbabwean Secondary schools.

1. How do teachers perceive the inclusion of ethnobotany in the secondary school curriculum?
2. What are the perceived benefits of integrating ethnobotany into teaching and learning?
3. What challenges do teachers encounter in integrating ethnobotany into their classroom practice?
4. What strategies can support the effective integration of ethnobotany in secondary schools?

5.1.1. Teachers' Perceptions of the Inclusion of Ethnobotany in the Secondary School Curriculum

The results reveal that teachers generally hold positive perceptions toward the inclusion of ethnobotany in the secondary school curriculum. Many view ethnobotany as a relevant and culturally meaningful component that can enrich science education, promote contextual learning, and align with Zimbabwe's competency-based curriculum. These perceptions reflect broader regional findings indicating increasing teacher appreciation for Indigenous Knowledge Systems (IKS) when curriculum reforms emphasize cultural relevance

(Mlotshwa, 2024; Compan et al., 2025). Teachers also expressed recognition that ethnobotany fosters learner engagement by connecting scientific concepts to everyday experiences, consistent with the literature suggesting that contextualized instruction strengthens conceptual understanding (Gutiérrez-García, 2024). Nonetheless, teachers' enthusiasm is moderated by concerns regarding their limited content knowledge and the absence of clear curricular guidelines, a pattern also noted across comparable African contexts (Parsley et al., 2022; da Silva, 2024).

5.1.2. Perceived Benefits of Integrating Ethnobotany into Teaching and Learning

The results indicate that teachers perceive multiple pedagogical and socio-cultural benefits associated with integrating ethnobotany into teaching and learning. Participants highlighted that ethnobotany enhances relevance, learner motivation, and conceptual understanding, especially in topics related to plant biology, ecology, and environmental sustainability. These perceptions align with existing scholarship which emphasizes that ethnobotany serves as a bridge between scientific knowledge and cultural heritage, thereby deepening learners' appreciation of biodiversity and conservation (Gutiérrez-García, 2024; Schunko et al., 2024). Teachers also noted that ethnobotany promotes heritage-based education and strengthens community school relationships, consistent with the national curriculum's emphasis on contextualized learning (MoPSE, 2021). Several respondents emphasized that ethnobotany fosters critical thinking and practical skills through fieldwork and experiential learning, echoing findings by Chingombe et al. (2023) who observed that school gardens and community-based projects enhance learner engagement and environmental responsibility.

5.1.3. Challenges Teachers Encounter in Integrating Ethnobotany into Practice

The results reveal that teachers face a range of persistent challenges when attempting to integrate ethnobotany into classroom practice. The most commonly cited constraints include lack of teaching and learning resources, such as plant guides, field equipment, and context-specific instructional materials, a challenge also highlighted by Mlotshwa (2024). Teachers also struggle with limited content knowledge and pedagogical confidence, reflecting wider regional trends where educators feel underprepared to teach culturally rooted content (Rinto, 2023; Parsley et al., 2022). Teachers noted that the absence of clear curricular guidelines and lack of explicit alignment with ZIMSEC assessment expectations create uncertainty about how and when to embed ethnobotany into exam-driven teaching schedules (Mutseekwa,

2021; Sunzuma et al., 2022). Time constraints, large class sizes, and the need to secure community involvement further compound implementation challenges. These results mirror literature that underscores structural and systemic barriers that hinder the integration of Indigenous knowledge in formal schooling (Compan et al., 2025; Schunko et al., 2024).

5.1.4. Strategies to Support Effective Integration of Ethnobotany in Secondary Schools

The results identify several strategies that teachers believe are essential to support the effective integration of ethnobotany in secondary schools. The most prominent recommendation is the development of clear curricular frameworks and policy guidance that formally embed ethnobotany within science and environmental studies syllabi, reflecting arguments by da Silva (2024) and Mlotshwa (2024). Teachers emphasized the need for curriculum mapping and modular designs that explicitly link ethnobotany to examinable concepts, consistent with suggestions by Lestari (2024) and Gutiérrez-García (2024). The results also underline the importance of teacher professional development, especially practice-oriented training on plant identification, lesson planning, and ethical engagement with knowledge holders (Schunko et al., 2024; Mutseekwa, 2021). Respondents further recommended strengthening community partnerships, citing that elders, traditional healers, and local farmers hold essential knowledge that can enhance authenticity in teaching (de Borba Antonelli et al., 2024). Additional strategies include providing low-cost teaching resources, incorporating school gardens, facilitating field excursions, and reforming assessment to include performance-based tasks that acknowledge ethnobotanical learning (Chingombe et al., 2023; Compan et al., 2025).

5.2. Conclusion

This study set out to explore teachers' views on the integration of ethnobotany into the Zimbabwean secondary school curriculum, with particular focus on their perceptions, the perceived benefits, the challenges encountered, and the strategies needed for effective implementation. The findings demonstrate that teachers generally value ethnobotany as a culturally relevant and pedagogically enriching component of the curriculum. They view it as a vital means of connecting learners to Indigenous knowledge, promoting contextualized learning, and fostering environmental stewardship. These perceptions align with current scholarship emphasizing the importance of culturally grounded science education (Mlotshwa, 2024; Schunko et al., 2024).

The study also established that teachers recognize multiple benefits associated with integrating ethnobotany, including enhanced learner engagement, strengthened cultural identity, and improved understanding of biodiversity and sustainable use of plant resources. These findings reinforce broader literature suggesting that ethnobotany contributes to holistic learning outcomes that extend beyond conventional scientific knowledge (Gutiérrez-García, 2024; Compan et al., 2025).

However, results also reveal significant challenges that hinder effective implementation. Teachers highlighted limited curriculum clarity, insufficient teaching resources, inadequate training, assessment constraints, and limited collaboration with community knowledge holders as major barriers. These challenges mirror concerns raised in regional and global studies, which consistently report gaps in teacher preparedness, policy support, and resource availability in Indigenous knowledge integration (Parsley et al., 2022; Mutseekwa, 2021).

Despite these constraints, teachers identified several practical strategies to enhance the integration of ethnobotany. These include strengthening policy and curricular guidance, providing targeted professional development, fostering community partnerships, improving access to localized teaching materials, incorporating experiential learning activities, and aligning assessment practices with ethnobotany-related competencies. Such strategies are widely supported in the literature and underscore the need for a multi-stakeholder, systemic approach to Indigenous knowledge inclusion (Chingombe et al., 2023; Sunzuma et al., 2022).

Overall, the study concludes that while Zimbabwean teachers are positively inclined toward ethnobotany education, its successful integration requires deliberate action at policy, curriculum, school, and community levels. Enhancing teacher capacity, ensuring resource availability, and embedding ethnobotany within formal assessment structures will be crucial for transforming the current enthusiasm into sustainable classroom practice. The findings contribute valuable insights into strengthening culturally responsive science education in Zimbabwe and supporting national goals of heritage-based, contextually relevant learning.

5.3. Recommendations

Based on the study's findings, several key recommendations can guide policymakers, curriculum planners, teacher educators, and school leaders in strengthening the inclusion of ethnobotany in Zimbabwean secondary schools. First, the Ministry of Primary and Secondary

Education should strengthen policy and curriculum alignment by providing explicit guidelines that show how ethnobotany fits within existing learning outcomes, particularly in science, agriculture, and environmental studies. This should include curriculum mapping tools, exemplar lesson plans, and assessment criteria that legitimize ethnobotany as a valued component of the national curriculum.

Second, enhanced teacher preparation and professional development are essential for sustainable implementation. Teacher training colleges and universities should embed ethnobotany within pre-service science education courses, while in-service programs should offer workshops on plant identification, culturally respectful engagement, and inquiry-based pedagogies. A cascade model where trained lead teachers support colleagues in their districts would help ensure consistency and increase teacher confidence across provinces.

Third, the study recommends strengthening partnerships between schools and local communities, particularly elders, traditional healers, farmers, and environmental practitioners who possess ethnobotanical knowledge. Schools should establish ethical protocols for knowledge sharing, including informed consent and benefit-sharing, to ensure respectful collaboration. Community involvement not only enhances authenticity but also reinforces the cultural relevance of learning.

Fourth, improving the availability of teaching and learning resources is crucial. The Ministry, in collaboration with universities, botanical institutions, and NGOs, should develop accessible materials such as plant field guides, simple herbarium kits, digital plant databases, and offline multimedia tools. These supports are particularly important for rural schools that lack laboratory facilities or internet connectivity.

Fifth, the integration of experiential learning opportunities such as school gardens, field excursions, and citizen-science projects should be prioritized. These methods allow learners to observe, classify, and investigate plants in real contexts, promoting both scientific understanding and cultural appreciation. Schools should link these activities with ongoing environmental education programs to strengthen relevance.

Finally, the study recommends reforming assessment practices to include project-based, performance-based, and continuous assessment activities that recognize practical and

contextual learning. Embedding ethnobotany in ZIMSEC-aligned assessments will incentivize teachers to incorporate it consistently into their teaching.

Together, these recommendations provide a coherent framework for advancing ethnobotany education in Zimbabwean secondary schools, ensuring that Indigenous knowledge is preserved, valued, and integrated meaningfully within formal schooling.

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7.0. APPENDIX

7.1. INTERVIEW SCHEDULE

Purpose:

To elicit detailed insights into biology teachers' perceptions, beliefs, experiences, and suggestions regarding the integration of ethnobotany into the secondary school biology curriculum in Zimbabwe.

Research Question 1: Teachers' Perceptions of Ethnobotany Integration

1.1. How do you perceive the inclusion of ethnobotany in the secondary school biology curriculum?

Sub-questions:

1. How would you define ethnobotany in your own understanding?
2. How familiar are you with ethnobotanical knowledge or indigenous plant use?
3. Have you ever included ethnobotanical examples in your lessons? If so, in what topics?
4. In your opinion, how relevant is ethnobotany to the current biology syllabus?
5. How do your learners respond when you include local plant knowledge in teaching?
6. Do you think ethnobotany aligns with modern scientific knowledge? Why or why not?
7. What is your attitude towards teaching content that draws from indigenous knowledge systems?
8. How does your school administration or curriculum policy view such integration?

Research Question 2: Perceived Benefits of Integrating Ethnobotany

2.1. What benefits do you associate with integrating ethnobotany into teaching and learning?

Sub-questions:

1. How do you think ethnobotany can improve learners' understanding of biological concepts?
2. In what ways does it make biology more relevant to learners' daily lives?
3. Do you think ethnobotany can help preserve local cultural knowledge? Please explain.
4. How might the integration of ethnobotany motivate learners or increase their participation?
5. Could ethnobotany enhance collaboration between schools and local communities? How?
6. How might ethnobotanical knowledge promote environmental awareness or conservation?
7. What long-term benefits do you foresee for students or communities if ethnobotany is included in the curriculum?
8. How could ethnobotany contribute to achieving educational goals such as Education for Sustainable Development (ESD)?

Research Question 3: Challenges in Integrating Ethnobotany

3.1. What challenges do you encounter in integrating ethnobotany into your classroom

practice?

Sub-questions:

1. Are there adequate teaching and learning materials that include ethnobotanical content?
2. Have you received any formal training on how to integrate indigenous knowledge into biology teaching?
3. How does the current biology syllabus support or limit the teaching of ethnobotany?
4. What challenges do you face regarding time or syllabus coverage when including ethnobotanical examples?
5. Do you feel confident in your own knowledge of ethnobotany? Why or why not?
6. Are there cultural or ethical sensitivities that make it difficult to discuss certain ethnobotanical topics?

7. How supportive are school administrators and curriculum supervisors toward such integration?
8. What systemic or institutional barriers exist to incorporating ethnobotany in your teaching?

Research Question 4: Strategies to Enhance Integration

4.1. What strategies do you suggest to support the effective integration of ethnobotany into the

Secondary school curriculum?

Sub-questions:

1. What kind of teacher training or professional development would help you teach ethnobotany more effectively?
2. How can curriculum developers or policymakers better support teachers in integrating indigenous knowledge?
3. What teaching resources or materials would make integration easier?
4. How can local communities and elders contribute to ethnobotany education?
5. Would collaboration among teachers (e.g., through workshops or clusters) be beneficial? How?
6. What role can universities or teacher training colleges play in promoting ethnobotany in education?
7. How might assessment methods be adapted to include indigenous knowledge content?
8. What policies or initiatives could help ensure that ethnobotany becomes a sustained part of biology education?