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Physical Sciences Student Teachers' Choices about Educational Materials when Planning for Classroom Instructions during Micro-Teaching

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Abstract

The objective of this study is to investigate the curriculum materials physical sciences student teachers choose while developing lesson plans in preparation for micro teaching, both independently and collaboratively and to explore the reasons why student teachers choose those curriculum resources. The study was framed around the Constructivist Theory. A whole class of 87 Bachelor of Education students in their third year of study who registered for a Physical Sciences Teaching module in the beginning of 2023 academic year were invited to take part in the study. In preparation for teaching practice, student teachers were tasked with individual and group lesson plans for micro teaching, where they chose curriculum materials for their micro teaching lessons and give reasons for their choices. Data was collected using interviews, focus group discussions and classroom observations. Data was analysed using descriptive analysis and thematic analysis framed around the construct developed by Siedel and Stylianides's (2018). The study found that student teacher chose several curriculum materials for both individual and group work using the 5E framework as a guide. In addition, student teachers considered variables such as those linked to the learners, teaching methods, science content, culturally driven, availability and any constraints that may be present in their lesson plans and during micro teaching. In essence, this study highlights the nuanced decision-making process that student teachers undergo, emphasizing the multifaceted nature of curriculum material selection. Recognizing the dynamic interplay of these factors is crucial for educational policymakers, curriculum developers, and school administrators aiming to support teachers in making informed choices that ultimately enhance the quality of science education provided to learners. Future research could underscore the need for ongoing research and dialogue in the realm of curriculum development, with a focus on empowering science teachers with the tools and resources to navigate this intricate landscape effectively.

Keywords: *Curriculum Materials; Lesson Planning; Individual Lesson Planning; Group Lesson Planning; Physical Sciences*

Introduction

Curriculum materials, or educational materials, are physical objects that contain and guide the content, teaching techniques, and sequence of instruction, whether for a single lesson or a series of lessons (Moore, Coldwell & Perry, 2021). Curriculum materials have a vital and complex role in the education system. These instructional components include classroom activities, lesson plans, assessments, curriculum plans, and schemes of work (Charalambous & Hill 2012). Curriculum materials provide a connection between school and teacher practices and the content, objectives, pedagogical methods, scheduling, and order of subjects (Ball & Cohen, 1996). The selection of curriculum materials is a crucial aspect of lesson planning for physical sciences student teachers. The choice of appropriate materials can significantly impact the effectiveness of instruction and learner learning outcomes. This research aims to explore the decision-making processes of physical sciences student teachers when choosing curriculum materials in both individual and group lesson-planning contexts.

The existing literature on teachers' use of curriculum materials provides valuable insights into the broader field of curriculum design and pedagogy. Studies by Remillard (2005) and Forbes and Davis (2010) have examined the mobilization and adaptation of science educational materials by elementary student teachers, highlighting their ability to assess and modify materials to align with inquiry-based approaches. Schwarz et al. (2008) have explored the use of reform-based criteria to critique curriculum materials, emphasizing the importance of engaging student teachers in authentic practices. These studies shed light on the potential of student teachers to make informed decisions about the choice of curriculum materials to inform classroom practices.

While there is a significant body of literature on teachers' choices of curriculum materials (Forbes & Davis, 2010; Moore et al., 2021; Ulusoy & İncikabi, 2023) there is a noticeable gap in the specific context of the physical sciences subject. The majority of the literature found focus on mathematics education (Potari, 2023; Ulusoy & İncikabi, 2023) general curriculum design, or other subjects (Grecu, 2023; Lord et al., 2023; Moore et al., 2021; Schwarz et al., 2008), with limited research specifically addressing the choices of curriculum materials by physical sciences student teachers during micro teaching. Nevertheless, there exist a scarcity in the existing body of research that particularly addresses the process of curriculum material choices and their reasons for their choices among student teachers in the field of physical sciences. Although research in other disciplines, such as mathematics (Ulusoy & İncikabi, 2023) and general science (Schneider et al., 2005), offer valuable insights into curriculum selection and teacher decision-making, the unique context of the physical sciences subject requires specific attention.

The lack of literature in this area is concerning because the physical sciences subject encompasses disciplines such as physics, and chemistry, which have unique content and instructional needs in the South African context. The selection of appropriate curriculum materials is crucial for teachers to effectively teach this subject and engage learners in meaningful learning experiences. The existing literature on curriculum materials in other subjects may provide some insights that can be applied to the physical sciences classrooms. For example, the studies by Remillard (2005) and Davis and Krajcik (2005) discuss the challenges of selecting and adapting curriculum materials, which can be relevant to the physical sciences context. However, there is a need for research specifically focused on the physical sciences subject to address its unique characteristics and instructional requirements. Additionally, the one study in the science education literature focused on curriculum materials specifically investigated the influence of several factors on the utilization of curriculum resources by high school chemistry teachers (Chen et al., 2020) which offered some insights into three levels of thinking and acting involving different levels of interaction between teachers and curriculum materials.However, these studies do not specifically address the subject of student teachers' choices and decision-making processes in selecting curriculum materials for physical sciences lessons, highlighting the need for research that specifically examines the

choices and reasons for selecting curriculum materials in physical sciences when planning for micro teaching.

Recognizing the process by which student teachers in physical sciences choose curriculum materials is crucial for their professional growth and the improvement of their future teaching methods. An examination of the processes involved in creating lesson plans for individuals and groups can yield useful insights about the various aspects that impact their decision-making, including their expertise in the subject matter, their pedagogical knowledge, and their collaboration with colleagues. By addressing this research gap, this study aims to contribute to the field of student-teacher education and curriculum design in the physical sciences subject. The findings will inform the development of effective strategies and support systems for physical sciences student teachers in selecting and utilizing curriculum resources that align with inquiry-based approaches and promote student engagement and learning.

Several studies emphasize many crucial factors pertaining to teacher decision-making process in the selection of curriculum material. One common challenge is the requirement to differentiate between the impacts resulting from the materials themselves and the impacts resulting from teachers' interactions with the materials (O'Donnell, 2008). Accurately assessing the feasibility of implementation is crucial, as it can be challenging to ascertain the degree to which teachers are accurately executing the planned curriculum (O'Donnell, 2008). Teachers are also responsible for modifying curriculum materials to suit the needs of their learners in different context (Schneider & Krajcik, 2002). The process of modification necessitates thorough deliberation and discernment to guarantee that the resources are in line with instructional objectives and aptly facilitate learners learning. Moreover, there exists a bone of contention between the decision-making of teachers about the curriculum and the aims of those who construct the curriculum (Forbes & Davis, 2010). Teachers' autonomy in decision-making and the specified curriculum can often create a perceived conflict, despite the growing importance placed on teachers' role in analysing and adjusting curriculum materials. Teachers' awareness and reflection on their decision-making processes can also be areas for improvement (Hou et al., 2023). Research suggests that teachers' empirical decision-making is evident, and there is a need for further development of their professional abilities in this regard. Additionally, the literature emphasizes the importance of teachers' orientations and meaning-making processes when engaging with curriculum materials (Raymond, 2021; Remillard & Bryans, 2004). Teachers' orientations towards the materials and their ability to make meaning from them play a crucial role in how they select and use curriculum materials to enact coherent and effective instructions.

Teachers use curriculum materials in a flexible and adaptable manner to cater to the unique needs, preferences, and backgrounds of their learners (Enyedy & Goldberg, 2004). While choosing and modifying curriculum materials are crucial components of teaching practice, student teachers have challenges in performing this role (Grossman & Thompson, 2008). Teachers without the ability to effectively choose and modify curriculum materials may struggle to identify the merits and drawbacks of these resources. Conversely, they could implement changes that hinder progress or neglect to implement necessary adjustments. Hence, it is important to provide student teachers with the necessary skills to choose and modify curriculum materials. This study investigates the manner in which student teachers engage in individual and group lesson planning process during micro teaching while receiving help in their science methods course. The focus is on their choices and reasons for their choices of curriculum materials to prepare for individual and group lesson plans during micro-teaching using three frameworks of instructional practices.

Against this background, this study sought answers to the following research questions:

1. Which framework guides physical sciences student teachers' choices about curriculum materials when preparing a lesson plan individually and with a group during microteaching?
2. What reasons do physical sciences student teachers provide for their choices of curriculum materials based on their selected framework?

Literature Review

The Process of Lesson Planning

Lesson planning is an essential process in education that entails creating and arranging instructional activities to fulfil specific learning goals. The literature offers useful insights on several facets of lesson planning, such as the utilization of curriculum resources, teacher acquisition of knowledge, cooperation, and the influence on learner performance.Remillard (2005) presents a conceptual structure for examining the way teachers engage with curriculum materials, which is an essential element of lesson preparation. Gaining insight into how teachers interact with curriculum materials may provide valuable guidance for designing and choosing resources that are in line with instructional objectives and student needs. Davis and Krajcik (2005) examined the development of curriculum materials that facilitate learner learning. These resources function as cognitive tools that are integrated into teachers' practices, offering support and direction to improve their pedagogical expertise and teaching methods. Raymond (2021) presents a transactional perspective on the curriculum system, emphasizing the ever-changing character of teachers' daily interactions with curriculum materials. This viewpoint highlights the interaction between teachers and curriculum materials, emphasizing the need of taking into account the broader curriculum system while organizing lessons. Takahashi and McDougal (2016) highlight that collaboration is an important element of lesson planning. Their discussion revolves around collaborative lesson research, specifically lesson study, which entails a group of teachers collaborating to organize, observe, and analyse classes. By adopting this collaborative approach, teachers may get valuable insights into the teaching-learning process and enhance their instructional methods.

Teachers' Choices on Curriculum Materials

The process of selecting curriculum materials by teachers is intricate and impacted by several factors. Teachers' ideas about the topic and instruction, together with their pedagogical knowledge and content expertise, are crucial factors (Polly, 2016). The opinions of teachers on the instructional approach for a particular topic significantly influence their selection of curriculum materials (Thornton, 2020). Furthermore, it is essential for teachers to have a deep understanding of the curriculum and the learning processes of learners in order to successfully make use of the diverse array of materials at their disposal (Tronsmo, 2018). Curriculum materials, including textbooks and instructional media, are crucial resources that teachers depend on to organize their teaching (Forbes & Davis, 2010). The purpose of these resources is to offer instructional guidance and assistance to teachers in the classroom (Roblin et al., 2018). According to Rezat et al. (2021), the connection between teachers and curriculum resources is dynamic and collaborative. Teachers utilize established curriculum and corresponding curriculum materials to direct their preparation and instruction, acquire knowledge about reform-oriented methodologies, and make informed pedagogical choices (Friedrichsen & Barnett, 2018).

It is crucial to acknowledge that curriculum is more than simply a set of materials, but rather is something that is experienced in many settings (Remillard, 2005). Teachers utilize curriculum materials as resources while implementing these experiences (Remillard, 2005). Curriculum materials have the potential to influence the results of both learners and teachers (Roblin et al., 2018). Hence, it is imperative for teachers to accurately evaluate the essential characteristics of curriculum materials that correspond with their teaching objectives and the needs of their learners (Roblin et al., 2018).

Remillard (2005) presents a structured approach for examining the way teachers engage with curriculum content. This paradigm prioritizes the dynamic connection between teachers and curriculum resources, emphasizing the impact of both teachers' traits and curriculum materials on their teaching methods. This viewpoint acknowledges that teachers actively interact with curricular materials and make judgments based on their own expertise and understanding. Rezat et al. (2021) emphasize the significance of teachers in facilitating students' use of educational resources. According to their argument, the

utilization of instructional resources by students is perceived as being influenced by their instructors. Teachers have a vital responsibility in choosing and utilizing curriculum resources that are suitable for their learners' needs and learning objectives. Polly (2016) highlights the significance of teachers' views and expertise in the process of choosing and utilizing curriculum materials. In addition, Raymond (2021) suggests a transactional perspective on the curriculum system, acknowledging that teachers' engagement with curricular materials is a fluid and continuous process.This viewpoint underscores the many interpretations of teachers' engagements with curriculum materials and underscores the significance of taking into account the broader curriculum framework within which teachers' function. Furthermore, Davis & Krajcik (2005) assert that the design of instructional materials should aim to facilitate teacher learning. They propose the inclusion of explicit justifications for decisions into curriculum materials to assist teachers in assimilating their knowledge base and establishing links between theory and practice. This underscores the capacity of curriculum materials to bolster teachers' professional growth and amplify their instructional methodologies.

Another key component that has been addressed in recent years is the criteria, whether implicit or explicit, that teachers use to pick curriculum materials. Various studies have found that teachers take specific factors into account while choosing curriculum materials. The criteria encompassed in this study consist of the seamless integration of classroom norms, the high quality and adaptability of the content, the relevance and usefulness of the materials, and the appropriateness to the student's developmental level (Baştürk-Şahin & Tapan-Broutin, 2018; Diekema & Olsen, 2012; Gueudet & Trouche, 2012; Ulusoy & İncikabı, 2020). Furthermore, only a limited number of research studies have explicitly examined the criteria used to pick resources (Siedel & Stylianides, 2018; Trgalová et al., 2019). For example, Siedel and Stylianides (2018) created a classification system that organises teachers' choice of resources into significant topics. When selecting curriculum resources, teachers largely took into account attributes associated with teacher control, student engagement, and alignment with mathematics, as stated by Siedel and Stylianides (2018). The authors suggest that this classification might assist in the deliberate selection of educational resources for teachers who find it challenging to find worthwhile alternatives in a time of abundance.

Theoretical Framework

The Relevance of Curriculum Materials in Science Classrooms

According to the National Research Council (NRC, 2007), curriculum materials can serve as a method to enhance student engagement and performance in the field of science. Curriculum materials have a significant impact on classrooms, influencing the content and methods used by teachers (NRC, 2002). According to Ball and Cohen (1996), this influential effect is elucidated:

> *"Unlike frameworks, objectives, assessments, and other mechanisms that seek to guide curriculum, instructional materials are concrete and daily. They are the stuff of lessons and units, of what teachers and students do. . . . Not only are curriculum materials well positioned to influence individual teachers' work but, unlike many other innovations, textbooks are already "scaled up" and part of In addition, Schmidt, Houang, and Cogan (2002) advise against attempting to enhance instruction in a manner that is separate from endeavours to enhance the curricular materials accessible to instructors and students. the routine of schools. They have "reach" in the system*". (p. 6)

"If we pretend that the textbook doesn't exist—and conduct PD in ways that assume teachers will implement an entirely different approach to content than the texts—believe me, the textbook will win" (p. 18). Harris et al. (2015) highlighted the importance of curricular materials in shaping the academic achievements of students in science courses (Harris et al., 2015). The argument was further

substantiated by Krajcik et al. (2007) who emphasised the need for curriculum materials to conform to national standards to enhance students' learning outcomes.

These studies jointly emphasise the crucial significance of curriculum materials in influencing science education and highlight the need to have support mechanisms for teachers in curriculum materials and the practical adjustment of materials by teachers in training.

Constructivism

Constructivism is a theoretical paradigm that highlights the proactive involvement of learners in the process of developing their knowledge and comprehension (Windschitl, 2002). As per this concept, teachers have a vital role in assisting the learning process by establishing a supportive and engaging learning environment (Sofiana et al., 2022). Vygotsky's research highlights the interplay between the teachers' practices and the students' existing knowledge, as well as the significance of the social construct of knowledge. Students and teachers may employ comparable terminology to articulate ideas, but they often possess distinct subjective understandings of those ideas. Vygotsky's research suggests that when designing science curriculum and instruction, it is important to acknowledge the disparities between the teacher's and student's understandings. It is also crucial to allow ample time for students to interact with one another, as this enables learners to develop concepts based on the perspectives of their peers who have similar understandings and interpretations. When selecting curriculum materials, student teachers who adopt a constructivist approach take into account various factors. Initially, student teachers evaluate the congruence of curriculum materials with constructivist ideas. They seek resources that encourage active participation, experiential learning, and the chance for students to independently develop their understanding (Sofiana et al., 2022). The materials include tasks that have several possible solutions and are based on real-life situations, enabling students to investigate and establish relationships between different concepts (Davis & Krajcik, 2005). Student teachers strive to cultivate an educational setting that promotes critical thinking, problem-solving, and teamwork by carefully choosing these resources (Sofiana et al., 2022). Furthermore, student teachers evaluate the realness and pertinence of educational materials and seek out resources that accurately represent the various backgrounds, experiences, and interests of the students (Kisige et al., 2021). The materials should possess cultural responsiveness and inclusivity, enabling students to perceive their own identities and communities reflected in the content (Kisige et al., 2021). Student teachers take into account the flexibility and adaptation of curriculum materials, that may be tailored and adjusted to accommodate the varied requirements and capacities of their pupils (Davis & Krajcik, 2005).

Methodology

This study employed an interpretivist case study approach. A qualitative multiple case study design within an interpretivist framework is a research approach that aims to deeply explore and understand complex phenomena from the perspectives of the participants (Lewis, 2015). This approach is often used when researchers want to explore the social, cultural, and contextual aspects that influence the phenomena under investigation (Lewis, 2015). In this study, the author explored student teachers' choices and their decision-making process when selecting educational materials for individual and group lesson planning. Multiple case study provides a comprehensive insight into this intricate topic (Brink, 2018).

In a multiple case study design, the selection of participants should be purposeful to provide diversity and richness to the understanding of the phenomenon (Brink, 2018). It is important to select cases that represent different contexts, perspectives, and experiences related to the research question (Brink, 2018). In this study, the author selected 87 student teachers from one department for mathematics and sciences who registered for a module in Physical Sciences Teaching I. The participants were university student teachers in their third year of study. These participants have initially completed

modules in physics and chemistry (I and II) but are currently registered for Physical Sciences Teaching (I) as their third year second major pedagogical module. All of the participants willingly and of their own accord took part in the study.

Data collection in a qualitative multiple case study involves various methods such as interviews, observations, and document analysis to provide a comprehensive understanding of the phenomenon (Lewis, 2015). The main instruments employed in this study were semi-structured interviews and classroom observations. Semi-structured interviews were conducted with the participants, allowing them to share their perspectives, experiences, and narratives (Lewis, 2015). Ten questions were designed around the construct of choice of curriculum materials and reasons for their choices. These questions were validated by three experts in the field. Observations protocols were designed to explore student teachers' reasons behind the choices when they did their micro-teaching. This was to help understand context, behaviours, and interactions that may not be captured through interviews alone.

Initially, the author collected data on the demographic characteristics of the participants in the study. The author informed the participants to disclose their age, gender, and the modules they had completed. The age range of the participants varied from 19 to 30 years, with an average age of 24 years.

The module for Physical Sciences Teaching 1 is a year-long module which comprises the following units" (a) Curriculum and curriculum reform in South Africa; (b) an introduction to the Curriculum and Assessment Policy Statement (CAPS) for Further Education and Training (FET) for Physical Sciences, (c)Approaches and methods of teaching in Physical Sciences, (d) Physical Sciences Educational Planning and Procedure (e)Development of Learning, Teaching Support Materials (LTSM), (f) frameworks for instructional developments, and (g) Learning and teaching strategies for Physical Sciences learning specifically focusing on learners with barriers and special needs.

Four of these units were completed in the first semester before students' teachers went on to teaching practice. In preparation for student teachers to go for teaching practice, microteaching activities were conducted where every student teacher was given the opportunity to prepare and teach for a one-hour period with their peers. In preparation for microteaching, student teachers were assigned topics based on the six strands of topics in the physical sciences curriculum for high schools (chemical change; chemical systems; matter and materials; electricity and magnetism; waves, sound and light, and mechanics). Student teachers who were assigned the same strands were put together in a group to plan for both group lesson plans and individual lesson plans.

The groups consisted of five student teachers who shared the same strand of topics. During the collaborative task, every group scrutinised the individual lesson plan of each member according to their topic. The group deliberated on each individual lesson plan, taking into consideration the three instructional development frameworks that were previously discussed (Gagne framework for instructional development; Hunter's seven steps of lesson planning; and the 5 E's lesson planning model). During the collaborative task, the groups were given ample time to generate their ultimate lesson ideas. During the last session, the groups had the option to utilise CAPS documents, textbooks, and any resources from their own lesson plans, or they may choose to find a new resource if they wished. Subsequently, the group lesson plans, and the individual lesson plans were collected from the student teachers. Thereafter, focus group interviews were conducted with the groups to analyse the decision-making process of the groups as they selected curriculum resources for the final lesson plan.

The last phase of data collection was conducted during the individual micro-teaching. Classroom observations protocol was used to understand the reasons for the choice of a particular curriculum resources utilised in the science classroom instructions by student teachers.

Data Analysis

Data analysis in an interpretive multiple-case study involves immersing oneself in the data to identify patterns, themes, and relationships (Lewis, 2015). Regarding RQ1, descriptive analysis within qualitative study was used to tally participants choices about their choices of curriculum materials during lesson plans for both individual and collaborative lesson planning process. Regarding RQ2, I employed thematic analysis (Lewis, 2015) to identify recurring themes, patterns, and meanings within the data, reflecting on the reasons student teachers give for their choice of particular curriculum materials, of significance is the integration of Siedel and Stylianides's (2018) framework, which examines the analysis of curriculum materials through six themes that elucidate teachers' rationales for selecting resources: student-driven, teacher-driven, science content-driven, constraints-driven, resource-driven, and culture-driven In an interpretivist approach, the researcher's role is to interpret the data and construct theoretical insights grounded in the participants' perspectives and experiences (Lewis, 2015). I also included in my analysis any comments from other parts of the focus group interviews, the individual interviews and the observation protocol.

I categorised all responses based on the framework by creating sub-themes and categories to encompass the intricate interaction of elements that affect the phenomena (Lewis, 2015). In order to guarantee the accuracy and reliability of the findings, various methods were utilised, including member verification, triangulation of data and peer debriefing. All the captured responses from the participants were sent back to the student teachers in order to confirm the accuracy of their responses. I combined responses from the focus group interviews, individual interviews and the observation protocols to confirm and support my findings. I further engaged in a discussion with fellow researchers to obtain feedback on my dataset.

The results of the analyses are presented below.

Results

Demographic Profile of Student Teachers

Participants supplied demographic data, including age and gender, in addition to the previously collected information on their academic year, programme phase, and pursued certification. Based on the descriptive statistical analysis of the demographic data shown in Table 1, the majority of the participants (97%) were under the age of 30. The gender distribution was precisely unbalanced, with 21% representation being female participants and 79% being male participants. Each participant was assigned a pseudonym.

Table 1: Demographic profiles of physical sciences student teachers

Gender	Female	18
	Male	69
Age	19 - 24	45
	25 - 29	39
	30 - older	3
Codes for participants: Focus group discussion codes: FGD1, FGD2, FGD3, FGD4, FGD5, FGD6, FGD7, FGD8, …...FGD17. Individual Student Teacher codes: IST1, IST2, IST3, IST4, IST5, IST6, IST7, IST8, IST9, IST10		10

Student Teachers' Choices of Curriculum Materials

Table 2 provides a descriptive analysis of the choices of student teachers on the topic for preparation to plan a lesson and choose appropriate instructional resources for the topic.

Table 2: Student teachers' choices of topics during lesson planning process

Strand	Choice of topic from strand	Frequency of choice of topic
Mechanics	Introduction to vectors and scalars	4
	Vectors in two dimensions	6
	Momentum and impulse	10
Waves, sound, and light	Transverse, longitudinal, and electromagnetic radiation	2
	Geometric optics	4
	Doppler effect	4
Electricity and magnetism	Magnetism	2
	Electrostatics	6
	Electric circuits	12
Matter and materials	State of matter	4
	Molecular structure	8
	Optical phenomena and properties of materials	8
Chemical change	Physical and chemical change	2
	Stoichiometry	2
	Chemical reactions	6
Chemical systems	Hydrosphere	0
	Lithosphere	0
	Chemical industry	7

From Table 2, it can be seen that student teachers selected topics on all the six strands of the physical sciences CAPS curriculum. The frequency of selection of each strand is given as follows; 22.9% each of the student teachers' population selected mechanics (n=20; 22.9%), electricity and magnetism (n=20; 22.9%) and matter and materials (n=20; 22.9%). 11.5% each of the student teachers' population selected waves, sound, and light (n=10; 11.5%) and chemical change (n=10; 11.5%). All student teachers employed the 5E instructional framework in their lesson plans. Although, student teachers were given the option to choose between three frameworks.

Student Teachers' Choices of Curriculum Materials during Lesson Planning

Research question 1 asked student teachers to choose curriculum materials they need to plan for their lesson in preparation towards microteaching. Table 3 provides information on student teachers choices based on the 5E framework of instructional development. From Table 3, it can be seen that all student teachers employed the 5E's lesson planning model in their choice of instructional materials in the preparation of their lessons. Based on the individual lesson plans, 73.6% (n=64) of the participants

selected activities from textbooks prescribed by the Department of Basic Education (DBE- South Africa) for each stage of the 5E lesson plan. According to Table 3, the utilisation of alternative teaching resources constituted a mere 26.4% during the stages of individual lesson plans. (5.7% laboratory materials; 13.7% models and visual aid materials; 6.9% multimedia and simulations). Although in the face of digital tools availability in tertiary institutions, student teachers used less of digital materials in their lesson preparations as materials for classroom instructions. Models and visual aid materials were also selected by most student teachers' (n=12; 13.8%) as the second option when they could not find enough information in the textbooks when preparing for classroom instructions. These student teachers were of the view that visual aids materials and models are ready made resources that intends to enhance their classroom instructions. They also preferred the ready to use materials than the ones they will print out for the learners.

Multimedia and simulations were listed as the third curriculum materials students' teachers choose when planning for microteaching (n=6; 6.9%). The curriculum materials student teachers selected, laboratory materials (n=5;5.7), were the least preferred. Similar cases were also observed in the group work.

Table 3: 5E Instructional framework as a guide for individual selection of curriculum materials

	Choice of curriculum materials for individual lesson plans				
Phases of 5E instructional framework	Textbook	Laboratory equipment	Models and visual aid materials	Multimedia and simulations	Frequency
Engage	64	5	12	6	87
Explore	48	20	8	11	87
Explain	60	9	13	5	87
Elaborate	43	20	12	12	87
Evaluate	56	14	12	5	87

Table 4: 5E Instructional framework as a guide for group choice of curriculum materials for group lesson plans

	Choice of curriculum materials for group lesson plans				
Phases of 5E instructional framework	Textbooks	Laboratory equipment	Models and visual aid materials	Multimedia and simulations	Frequency
Engage	6	1	1	1	9
Explore	4	2	2	1	9
Explain	5	2	1	1	9
Elaborate	4	1	2	2	9
Evaluate	6	1	1	1	9
Total	25(55)	7(16)	7(16)	6(13)	45 (100)

The situation is analogous when it comes to selecting curriculum materials for the group lesson plans in anticipation of taking into account students' viewpoints and scrutinising the recommended textbook in terms of comprehensibility.

Student Teachers' Reasons for Choice of Curriculum Materials

Table 5: criteria for selection of instructional materials with reasons in individual lesson plans

Criteria	Frequency	Percentage
Learners-Driven Selection		
Appropriate for learner needs	52	60
Building upon learners' prior knowledge	42	48
having clear guidance for learner	20	23
Being sensitive to learners' misconceptions	16	18
Teacher-Driven criteria		
Conformity to educational goals and objectives	68	78
Adhering to the instructional approach of 5E	46	53
Characterised with advanced cognitive abilities	10	11
Permitting diverse pedagogical methods	34	39
Suitability for manipulation	12	14
Science-Driven criteria		
Involvement of scientific skills	44	51
Unique to the teaching of science	36	41
Content appraisal	48	55
Constraints-Driven Criteria		
Economical	50	57
Appropriate for learner and teacher needs	32	37
Resource-Driven criteria	**6 (7)**	
Culture-Driven criterial	**8 (9)**	

Table 6: criteria for selection of instructional materials in group lesson plans

Criteria	Frequency	Percentage
Learners-Driven Selection		
Appropriate for learner needs	8	89
Building upon learners' prior knowledge	6	67

Having clear guidance for learner	4	44
Being sensitive to learners' misconceptions	2	22
Teacher-Driven criteria		
Conformity to educational goals and objectives	7	78
Adhering to the instructional approach of 5E	4	44
Characterised with advanced cognitive abilities	8	89
Permitting diverse pedagogical methods	4	44
Suitability for manipulation	2	22
Science-Driven criteria		
Involvement of scientific skills	3	33
Unique to the teaching of science	6	67
Content appraisal	2	22
Constraints-Driven Criteria		
Economical	1	11
Appropriate for learner and teacher needs	5	56

The analysis of the data was framed according to the framework developed by Siedel and Stylianides (2018) and interpreted. The approach encompasses teacher-driven, learner-driven, science content-driven, constraints-driven, resource-driven, and culture-driven aspects.

Theme 1: Criteria Determined by the Teacher

Four sub-themes arose from this overarching theme. The criteria for these include: (a) Conformity to educational goals and objectives (b) Adhering to the instructional approach of 5E (c) Characterised with advanced cognitive abilities, and (d) Permitting diverse pedagogical methods

Conformity to Educational Goals and Objectives

During both the individual and the group interviews, participants were of the view that they choose a particular instructional resource material because the chosen resource aligned with the CAPS curriculum objectives. Most of the participants were of the view that curriculum materials should align with the relevant state or national curriculum standards and learning objectives for physical sciences education, and cover the topics and content specified in the curriculum. One student teacher narrated during the individual interview:

I chose this material which is a model because I wanted my learners to be able to demonstrate objects on an incline plane and on flat surfaces, and to draw free body diagrams of objects on incline and flat surfaces, which are aligned with the curriculum objective. Therefore, I thought that if I select this material, it will help the learners to be able to accomplish this goal (IST5).

A similar sentiment was shared during the group focus group interview. All the groups mentioned that the curriculum materials selected were aligned with the CAPS curriculum and the lesson objectives. Two student teachers pointed out clearly during the focus group interviews from their respective groups.

Interviewer: what is the reason for the choice of this material for your group lesson plan?

Responses:

FGD1: Eish, my group selected this curriculum material (holding it and pointing out to the author) for the reason that they align with the learning goals that we listed in the lesson plan, which are also aligned with the curriculum for physical science. The curriculum material is also aligned with our chosen topic from the science content. Our intention was to enable learners to understand conservation of atoms and mass, so we are using clay as marbles and with toothpicks to show the bonding between the different atoms.

FGD7: The chosen textbook as our curriculum material has activities that are of learner interest and aligned with Blooms Taxonomy which are aligned further with the objectives of the lesson that we have planned for today.

The curriculum materials were also observed during micro-teaching. Student teachers used these materials to explain physical sciences concepts in the classroom.

Adhering to the Instructional Approach of 5E

Regarding this specific sub-theme, the majority of student teachers expressed the belief that the curriculum content selected for both individual and group lesson plans align with the 5E methodology. Most student teachers expressed agreement about the alignment of the selected curriculum materials with their teaching technique, specifically utilising the 5Es as their instructional framework.

From this research data, I can make an inference that the choice of curriculum material for both individual and group lesson plans is dictated by the teaching methodology employed to improve traditional instruction processes. One group narrated during the focus group interview:

Interviewer: what is the reason for choosing this kind of curriculum materials?

FGD16: Our topic is based on the mechanism of reaction and catalysis. We have decided to make our lesson an activity based by using set of beakers, reagents, and apparatus. We want our learners to explore, be engaged in the lesson as we explain and elaborate on the concept. This methodology is in line with the 5E instructional framework that we have adopted for our lesson plan. At the end of the lesson, we will be able to evaluate the outcome of our objectives.

Characterised with Advanced Cognitive Abilities

The majority of the student teachers comprehended the significance of clearly stating the objective of the topic to the learners and effectively verified that this aspect was incorporated in their lessons. In the initial lesson plan analysis, the student teachers acknowledged that the primary objective of the lesson was to impart knowledge about a certain characteristic of materials, which needed to be effectively conveyed to the learners. One participant has this to say:

I choose materials that are of high level thinking skills. This will enable me to develop within my student's ability to think abstractly and develop these skills in order to solve problems in chemistry (lesson topic was on organic chemistry in Grade 12) (IST8).

Most student teachers also implemented adjustments to facilitate learners' understanding of the goal, making it more meaningful and relevant to their own lives. Some participants whose topics were highly abstract, believed that their teachings would not be relevant to the everyday lives of the learners. Therefore, they opted to enhance the significance of their lessons by establishing connections between their activities and materials that may not be the exact materials but are still relevant to the lesson. They

achieved this by linking explicit and carefully analysed lessons to assess the extent to which they helped students in perceiving the cohesive narrative of the unit.

Permitting Diverse Pedagogical Approaches

Regarding the sub-theme of permitting diverse teaching approaches, the majority of student teachers expressed that they chose their curriculum materials to enable them to employ various instructional methods in their classroom environment. Student teachers believe that using several teaching strategies provides possibilities for learners to engage with the subject matter in diverse ways. For instance, during their review of the group lesson plan, the majority of participants noted that by using various instructional methods, learners will have the opportunity to delve deeply into topics and develop a comprehensive understanding of the concept's explanatory capacity.

The group echoed and reenforce that;

This lesson revolves around one experience with phenomena on the concept of electrolysis, which informs both hands-on experiment with aqueous solutions, where learners will have the opportunity to see how ions in aqueous solution transfer and deposit on the electrode making one electrode to increase in mass and the other electrode to decrease in mass. The group thought of using videos and simulations to enable learners observe first-hand experience of the phenomenon (FGD15).

However, some student teachers believe that their selection of curriculum materials is influenced by their preference for differentiated instruction. The teaching styles and preferences of each individual student teacher exhibited significant variation, underscoring their autonomy despite their appreciation for collegiality. This implies that participants chose materials based on their chosen instructional approach, personal motivation, and beliefs about the subject matter and the needs of their learners. This was observed during the micro teaching activity.

A few student teachers provided justifications for seeking materials when the necessity occurred while attempting to execute a pre-established strategy. In total, selection might take place either in a certain order or at different stages within a planning process.

Theme 2: Learner-Driven Criteria

Three sub-themes emerged under the learner-driven criteria as reasons for the choice of curriculum materials both in the individual and focus group lesson plans. These are; (a) Appropriate for learner needs, (b) Building upon learners' prior knowledge, and (c) Being sensitive to learners' misconceptions.

Appropriate for Learner Needs

Within this particular sub-theme, the majority of student teachers indicated that their choice of curriculum materials was most influenced by their students' needs. The majority of student teachers believe that when designing lessons, they frequently take into account the importance of incorporating diversity in order to enhance learner engagement, cater to the unique characteristics of the learner differences, adapt to different levels of achievement, and facilitate a range of specific and diverse activities, including various types of lessons. One student teacher had this to say during the focus group interview:

As a group, our reason for the choice of the instructional material was to ensure that we start explaining the concepts in momentum with concrete examples where models are used to represent the phenomenon under discussion. This will assist learners to link the information from the lesson to reality (FGD2).

However, during the individual interview, it was discovered that some student teachers choose curriculum materials to enhance the value given to the subject in order to add value for students' science learning. One student teacher had this to say:

Well, I choose these resources because I know that learners will be able to relate with the teaching resource materials with the content under discussion to enhance their comprehension of the concept. (IST6).

Classroom observation was also made about reusing of curriculum materials. This result implies that in response to learner needs, teachers would not necessarily look for new resources, but sometimes they can use materials that are readily available in the environment.

Building Upon Learners' Prior Knowledge

Most of the student teachers indicated that they chose a type of curriculum material to enable them to activate students' prior knowledge by using multimedia resources. with the use of this material, they would be able to connect the new content to be learnt to learners' existing knowledge base to provide context and relevance to the lesson. Participants were of the view that by utilizing these multimedia materials, their learners would respond better to the lesson and make clear connections between what they already know and the new material. With this materials, participants would be able to show how the new concepts are an extension or modification of their existing knowledge.

Being Sensitive to Learners' Misconceptions

Most of the participants were of the view that whenever they choose curriculum materials, they relate the curriculum material to the subject content using real-life examples and applications that learners can understand and relate to base on their experiences. This helps make abstract concepts more concrete and facilitates better understanding, as they make the material sensitive to the diversity of learners in the classroom. This implies that student teachers were aware of the differences learners bring to the science classrooms and the different levels of prior knowledge, and by adapting their teaching approaches and selecting resources that can help reach all learners in the classroom could enhance learners' understanding and motivation to learn physical sciences. One group has this to say:

We decided to select this material multimedia because we are aware of students' misconceptions about electric circuits. With these curriculum resources, we will be able to provide insights into the content explicitly address common misconceptions among learners and provide clarifications (FGD10).

Theme 3: Science Content-Driven Criteria

Three sub-themes emerged from this theme: (a) Involvement in scientific skills development, (b) Unique to the teaching of science, and (c) content appraisal.

Involvement in Scientific Skills Development

The majority of student teachers believed that their selection of teaching materials was effectively promoting the development of scientific abilities in learners, as guided by the science topic. Consequently, some student teachers linked the selection of curriculum materials to specific science content, suggesting that a resource may be considered particularly suitable for a specific topic but not for any other topic. Furthermore, multiple resources may be required for each topic.

Unique to the Teaching of Science

Investigating student teachers choices about curriculum materials, such as textbooks, online resources, and other materials has underscored the importance of providing student teachers with the necessary skills and support to utilize curriculum materials effectively in science education. Most student

teachers were of the view that to enable learners to understand science concepts, they need to use a variety of resources to help learners make progress toward the learning goals. The majority of student teachers were of the view that the material they have chosen would help to address both science concepts and practices. One student teacher has this to say:

You know, some topics in science are unique to science. As a result, we need to choose unique curriculum materials to complement the unique nature of science. We cannot just choose any material that is available in the environment. However, we need to consider the learning goals of the topic and the teaching methodology that we would employ in our classroom instructions (IST1).

Content Appraisal

Regarding the sub-theme content appraisal, the student teachers were of the view that the curriculum materials should be up-to-date and relevant to the topic or the subject matter. This is particularly important in science fields where knowledge evolves rapidly.

Some student teachers were of the view that they chose their respective curriculum materials so that the materials can reflect cultural sensitivity and diversity, as they see the importance of curriculum materials to be inclusive and represent a variety of perspectives, backgrounds, and experiences to create an enriching learning environment.

Some student teachers were of the view that their choices stemmed from the fact that they want to ensure that the curriculum materials are readily available and accessible to all their learners. This implies that student teachers consider factors such as cost, availability of resources, and any potential barriers to access, as they evaluate whether the materials represent diverse perspectives, cultures, and backgrounds to contribute to a more enriching learning experience for all their learners.

Theme 4: Constraints-Driven Criteria

Under this theme, two sub-themes emerged. These are: economical and appropriate for learner and teacher needs.

Economical

The majority of student teachers indicated that their decision to choose a certain resource is impacted by limitations on its accessibility. They referred to the factors such as money, technology, and time as constraining to their choices. Firstly, the selection of learning resources for instruction is influenced by the cost of materials. Three participants share the following sentiments.

Interviewer: Tell me your reasons for selecting this kind of curriculum materials?

IST3: I selected textbooks activities for my lesson today because of budget constraints. As you may know, I am a non-funded student, so I pay my fees and stuff like that. I could not afford to purchase any other material for my lesson. However, I know that the government supplies textbooks to schools freely and I can easily lay my hands on them and use with my learners.

IST8: I chose this artefact because I know that most curriculum materials are insufficient or outdated in the schools. Besides, limited laboratory space or inadequate facilities, may also be a factor since I cannot involve learners in hands-on activities if space is limited to implement certain hands-on or experiential activities.

IST7: I decided to use worksheets in the classroom since I do not have any expertise in the use of simulations. Hmm, using digital tools in a science classroom may enhance learner learning, however some of these digital resources may require specialized knowledge or training that as a

student teacher, I may not have. Although I registered for this technology module, I don't think I am ready to use those high-tech in my classroom.

The availability and integration of technology can be a constraint. If schools lack access to computers, internet connectivity, or other technological resources, teachers may need to choose materials that do not heavily rely on technology. Educators often need to ensure that the chosen materials align with established standards and prepare students for standardized assessments.

Appropriateness for Learner and Teacher Needs

Many student teachers reported their resource selection was influenced by constraints on appropriateness for learner and teacher needs. The need for curriculum materials to be culturally sensitive and inclusive may be a constraint. Finding materials that represent diverse perspectives and backgrounds can be challenging. Two student teachers have this to say:

IST 8: It takes all your time when selecting curriculum materials, especially when I have limited time for planning and preparation. Because of that, sometimes I tend to look for and choose materials that are readily available rather than a more extensive search. However, I ensure that the material is appropriate for the learners.

IST5: I wanted to incorporate digital tools in my lesson plans and use them as my curriculum materials for my lesson. However, due to time and lack of access to the full range of resources, I am restricted to pick just a few that are classroom ready, but appropriate for the learner.

Most student teachers expressed the belief that their choice of curricular materials may be influenced by a lack of awareness of available resources, as well as a lack of understanding on how newer forms of resources may enhance their work. Additionally, restrictions of the physical setting were identified as a potential factor.

Theme 5: Criteria Based on Available Resources

Several student teachers indicated that their choice of resources was impacted by the inherent features of the materials. The participants expressed that they chose those materials due to factors such as the availability of instructional content, and the convenience of use of the material. During the focus group discussions, two participants expressed their sentiments:

Interviewer: Hello guys, tell me why your group decided to choose these curriculum materials for your lesson plan today?

Responses:

FGD4: Teaching the concepts of rate of reactions cannot just be taught in the classroom without making the learners experience the process. For that reason, our curriculum materials that we chose included hands-on laboratory activities and experiments based on the availability of laboratory reagents and equipment.

FGD7: Our group decided to use simulations to demonstrate doppler effect. Hence, we will be using digital tools to enhance the teaching of our scientific concepts. With simulations in mind, our learners will be able to understand the concept well since they will be able to visualize the entire process in real time. We hope to get this curriculum material from the school laboratory. Even if we do not get it, we will borrow from other school.

During the micro-teaching activities, some student teachers demonstrated lessons using borrowed reagents and apparatus form external sources.

This implies that, resource-driven reasons for choosing curriculum materials in the science classroom are often tied to the practicalities of the available resources and technological infrastructure, professional development opportunities, and community support. The goal is to optimize the use of curriculum materials to provide effective and engaging science education.

Theme 6: Culture Driven Criteria

When selecting curricular materials for a science classroom, it is crucial to prioritise those that are culturally responsive and sensitive. This is necessary to provide an inclusive and efficient learning environment. The student teachers provided diverse cultural justifications for their choices of curriculum materials in the science classroom, both during the focus group interviews and the individual interviews. Some student teachers believed that certain materials were chosen based on both their own cultural background and that of their learners. The participants narrated during the individual interview.

Interviewer: Tell me about your reasons for choosing this kind of curriculum materials.

Responses:

IST2: In fact... when I chose this curriculum material, my reason was that the model I have chosen should reflect the cultural background and context of my learners. This will help the learners to see the relevance of the concept we will discuss in the classroom in their own lives and communities, making the learning experience more meaningful. Hopefully, they will be able to comprehend and understand the topic for the lesson.

IST9: my reason for choosing this model which I improvised will ensure that the curriculum material represents diverse scientific perspectives and will cater for all learners of various cultural backgrounds. This will help me in the classroom to challenge stereotypes and promote scientific literacy among my learners.

IST18: I chose a textbook because every learner has a copy of it. Besides, there are illustrations with examples from various cultures to illustrate some scientific principles. I will combine that with scenarios to enhance understanding but also demonstrate the universality of scientific concepts across different cultural contexts. I will also pay particular attention to language considerations, including the language proficiency of my learners, code-switching as we are used to, supporting better comprehension and learner engagement, and having the 5Es instructional framework at the back of my mind.

This implies that recognising and integrating indigenous knowledge with culturally sensitive curriculum materials and traditional practises into the classroom, as well as valuing indigenous views, enhance the comprehensive comprehension of scientific topics will enhance learner participation and engagement in the classroom.

Discussions

This study examined student teachers' choices and reasons given to their choices of curriculum materials when planning lessons for micro teaching. The discourse is around the interplay between student teachers' choices in creating individual and group lesson plans and the constructivism theory, as well as the significance of curriculum materials in science classrooms and the relevant literature.

Constructivism posits that teachers have a vital role in assisting the learning process by establishing a supportive and engaging learning environment (Sofiana et al., 2022). Therefore, it is important for science curriculum and teaching to acknowledge the disparities between the conceptions of teachers and learners. Additionally, it is crucial to allocate sufficient time for learners to engage in peer-

to-peer interaction, since this allows learners to construct ideas based on the understandings and interpretations of their peers that align more closely with their own. From the constructivist standpoint, teachers that embrace a constructivist approach by taking into account several factors. First and foremost, teachers evaluate the congruence of curriculum materials with constructivist ideas. They seek for resources that encourage active participation, learner engagement, experiential learning, and the ability for learners to independently develop their own understanding (Sofiana et al., 2022). Student teachers choose these curriculum materials to provide a learning environment that promotes critical thinking, problem-solving, and teamwork among their learners.

Regarding research question 1, the findings revealed that student teachers selected a variety of curriculum materials, including textbooks, worksheets, laboratory reagents and equipment, models and visual aids materials, multimedia and simulations, and artefacts. This observation aligns with the results of prior research, which have indicated that teachers rely significantly on textbooks when designing and organising science classes, whether for individual or group instruction (Forbes & Davis, 2010). Based on individual lesson plans, the majority of student teachers devised their lessons by selecting activities from the recommended textbook for each stage of the 5E lesson plan. The finding indicates that the use of other curriculum resources constituted just 26.4% for the individual lesson plans. Similar findings were also observed in the group lesson plans. Despite the widespread availability of digital technologies at higher institutions, student teachers utilised digital materials less frequently in their lesson preparations.

While choosing curriculum materials are crucial components of teaching practice, teachers have challenges in performing these responsibilities (Grossman & Thompson, 2008). Teachers without the ability to effectively choose and modify curricular materials may struggle to identify the merits and drawbacks of those items. Teachers have a vital responsibility in choosing and utilising curriculum materials that are suitable for their learners' requirements and educational objectives.

The second research question explored the reasons student teachers give for their choices of curriculum materials. From the constructivist perspective, teachers prioritise the flexibility and adaptability of curriculum materials. They seek for curriculum materials that can be personalised and adjusted to cater for the varied needs of their learners as they engage with the materials to create learner understanding (Davis & Krajcik, 2005). Using the framework developed by Siedel and Stylianides' (2018), the findings indicate that student teachers choose resources that can be modified to suit the learning environment, which caters to the distinct learning styles and preferences of their learners and considered the availability of curriculum materials. This finding corroborates with the findings by Ulusoy and İncikabi (2023), which identified four primary factors that impact the selection of curricular resources by preservice teachers throughout the process of individual lesson preparation. These factors include criteria linked to learners, teaching methods, mathematics-driven and constraints-driven factors. During both the individual and the group interviews, participants were of the view that they choose a particular instructional resource material because the chosen resource aligned with the CAPS curriculum objectives.

Regarding this theme, the majority of student teachers expressed the belief that the curriculum content selected for both individual and group lesson plans align with the 5E methodology. the majority of participants noted that by using various instructional methods, learners will have the opportunity to delve deeply into topics and develop a comprehensive understanding of the concept's explanatory capacity. This resonates well with the Enyedy and Goldberg (2004) assertion that teachers select and use curriculum materials in flexibly adaptive ways to meet the needs, interests, and experiences of their learners.

The study also found that the choice of curriculum materials was most influenced by the needs of learners. The majority of student teachers believe that when designing lessons, they frequently take into account the importance of incorporating diversity in order to enhance learner engagement, cater to the unique characteristics of the learner differences, adapt to different levels of achievement, and facilitate a

range of specific and diverse activities. This finding is in line with the assertion that, teachers' mastery of curriculum matters and learners' learning processes is crucial for effectively utilizing the wide range of resources available to them (Tronsmo, 2018) in the science classroom.

Most of the participants were of the view that whenever they choose curriculum materials, they relate the curriculum material to the subject content using real-life examples and applications that learners can understand and relate to base on their experiences. This helps make abstract concepts more concrete and facilitates better understanding, as they make the material sensitive to the diversity of learners in the classroom. This implies that student teachers were aware of the differences learners bring to the science classrooms and the different levels of prior knowledge, and by adapting their teaching approaches and selecting resources that can help reach all learners in the classroom could enhance learners' understanding and motivation to learn physical sciences. It is important to note that curriculum is not just a set of materials but something experienced in situations (Remillard, 2005). Teachers use curriculum materials as resources in the process of enacting these experiences (Remillard, 2005). The selection and use of curriculum materials can impact both learners and teacher outcomes (Roblin et al., 2018). Therefore, it is crucial for teachers to carefully consider the critical features of curriculum materials that align with their instructional goals and the needs of their learners (Roblin et al., 2018)

In addition, the study also found that student teachers choices stemmed from the fact that they want to ensure that the curriculum materials are readily available and accessible to all their learners. This implies that student teachers consider factors such as cost, availability of resources, and any potential barriers to access, as they evaluate whether the materials represent diverse perspectives, cultures, and backgrounds to contribute to a more enriching learning experience for all their learners. They look for materials that reflect the diversity of students' backgrounds, experiences, and interests (Kisige et al., 2021). These materials should be culturally responsive and inclusive, allowing learners to see themselves and their communities represented in the content (Kisige et al., 2021). By selecting materials that are meaningful and relatable to learners' lives, student teachers aim to enhance their motivation and engagement in the learning process (Sofiana et al., 2022).

Conclusions and Recommendations

In conclusion, this exploratory case study design delves into the intricate realm of student teachers' choices regarding curriculum materials and the underlying motivations that drive such decisions. Throughout the analysis, it becomes evident that these choices are far from arbitrary; instead, they are deeply rooted in a complex interplay of various factors. Pedagogical considerations, such as alignment with educational goals and suitability for diverse learning styles, emerge as pivotal determinants shaping student teachers' choices. Furthermore, the influence of institutional guidelines and standards cannot be overstated, as teachers often navigate a delicate balance between adhering to prescribed curricula and incorporating innovative, engaging materials to enhance the learning experience. Personal teaching philosophies and beliefs also significantly impact choices, underscoring the importance of individualization in the educational process. Socioeconomic factors and classroom demographics add an additional layer of complexity, as teachers strive to select materials that resonate with the diverse backgrounds and needs of their learners. In essence, this study highlights the nuanced decision-making process that student teachers undergo, emphasizing the multifaceted nature of curriculum material selection. Recognizing the dynamic interplay of these factors is crucial for educational policymakers, curriculum developers, and school administrators aiming to support teachers in making informed choices that ultimately enhance the quality of science education provided to learners. Future research could underscore the need for ongoing research and dialogue in the realm of curriculum development, with a focus on empowering science teachers with the tools and resources to navigate this intricate landscape effectively. Through a nuanced understanding of the intricate web of factors influencing teachers' choices,

we can foster a more responsive and adaptive educational system that meets the evolving needs of learners and equips teachers with the agency to shape meaningful learning experiences.

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