



TEACHERS' VIEWS ON LESSON PREPARATION USING 5E'S IN MATHEMATICS AND SCIENCES

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Received: February 03, 2024, **Accepted:** February 12, 2024, **Online Published:** February 15, 2024

ABSTRACT

Effective lesson planning is crucial for quality education. This qualitative study explored the perspectives of teachers in two ordinary public secondary schools in Gasabo District, Rwanda, regarding their use of the 5E instructional model in mathematics and sciences. Through purposeful sampling, a total of eight teachers from these schools were selected for in-depth interviews. The results acknowledged that the 5E model enhances student engagement, critical thinking, and concept retention. They appreciated its flexibility in adapting to different learning styles and abilities. Teachers encounter obstacles such as resource limitations and time constraints. Despite these challenges, they have developed innovative strategies to effectively integrate the 5E model into their lessons. Teachers express a desire for continuous training and support in implementing the 5E model effectively. They emphasize the importance of ongoing professional development to maximize its impact. This research contributes valuable insights into the practical application of the 5E instructional model in mathematics and sciences within the Rwandan context. The findings inform policy decisions and recommendations for enhancing teacher training programs and curriculum development in the Gasabo District and beyond.

Keywords: 5E Instructional Model, Lesson Preparation, Mathematics Education, Qualitative Study, and Science Education

1. Introduction

Quality education is a cornerstone of societal progress, fostering critical thinking and problem-solving skills among students. In the pursuit of educational excellence, the methodology of lesson preparation plays a pivotal role. In recent years, the 5E's instructional model, characterized by Engagement, Exploration, Explanation, Elaboration, and Evaluation, has gained prominence in the fields of mathematics and sciences. This model provided a structured framework for educators to create dynamic and immersive learning experiences.

Rwanda has been making significant strides in its commitment to education. The government's efforts to improve the education system have increased access to quality education at all levels. Mathematics and sciences are key subjects in the curriculum, vital for nurturing critical thinkers and future leaders. Consequently, it was crucial to investigate how teachers approach lesson preparation in these subjects, as this directly impacts students' learning experiences.

Rwanda's commitment to education was exemplified by its National Strategy for Transformation, which places education at the forefront of the nation's

progress. Gasabo District, one of Rwanda's vibrant regions, is home to a network of ordinary public secondary schools tasked with nurturing the next generation of scientists, mathematicians, and critical thinkers. Like many regions worldwide, the Gasabo District in Rwanda has seen an increasing emphasis on enhancing the quality of education in mathematics and sciences. This endeavor's success largely hinges on educators' perspectives and practices, specifically in terms of their lesson preparation methods.

In this endeavor, the 5E's instructional model emerged as a potential catalyst for enhancing the quality of education. The 5E's model was rooted in constructivist principles, aiming to make learning an active, student-driven process. By engaging students in hands-on experiences, encouraging questioning and exploration, and promoting peer collaboration, the 5E's model aligns with Rwanda's educational aspirations for holistic, competency-based learning. The 5E's instructional model, emphasizing engagement, inquiry-based learning, and hands-on activities, aligns with modern pedagogical theories and is a promising approach for improving teaching and learning outcomes.



However, its adoption and implementation within the Gasabo District's secondary schools must be explored. Understanding teachers' views and experiences with the 5E model in Gasabo District had far-reaching implications for curriculum development, teacher training, and policy formulation in Rwanda. This research contributes valuable data that can inform educational stakeholders, curriculum designers, and educators in their continuous pursuit of effective pedagogical strategies.

Therefore, this qualitative research study pursued to explore and understand the views and practices of teachers in the Gasabo District, with a particular focus on their use of the 5E's model in preparing lessons for mathematics and sciences.

2. LITERATURE REVIEW

Educators' role in shaping a nation's future cannot be overstated, particularly in the fields of mathematics and sciences, which serve as the bedrock of a nation's technological and scientific progress. Effective teaching strategies are essential to ensure that students grasp the fundamental concepts and develop a passion for learning.

One such pedagogical approach that has gained prominence in recent years is the 5E model. The 5E model encompasses five phases of instruction:

Engage, Explore, Explain, Elaborate, and Evaluate. This model fosters student-centered, inquiry-based learning experiences, aiming to make lessons more interactive, engaging, and conceptually deep. In Rwanda's educational landscape, where the quality of education is of paramount concern, exploring teachers' perspectives on implementing the 5E model in mathematics and sciences becomes crucial.

This literature review investigated existing research on teachers' views regarding lesson preparation using the 5E's in mathematics and sciences, specifically focusing on two selected public secondary schools in Gasabo District, Rwanda. Rwanda, a nation with a burgeoning commitment to improving its education system, has been actively seeking innovative approaches to enhance the quality of education provided to its students.

The 5E model presents an opportunity to shift from traditional rote-learning methods to more participatory and inquiry-driven pedagogies. Understanding how educators perceive and apply the 5E model in their classrooms offered valuable insights into the challenges and opportunities faced in the Rwandan educational context. The literature review examined relevant

studies, reports, and scholarly works that address the following key areas: the theoretical framework of the 5E model, its application in mathematics and sciences, the benefits and challenges associated with its implementation, and the specific context of Gasabo District, Rwanda.

By synthesizing existing research and identifying gaps in the literature, this review provided a comprehensive foundation for the subsequent qualitative study on teachers' views regarding lesson preparation using the 5E's in mathematics and sciences in the selected schools of Gasabo District, Rwanda. The findings of this literature review informed the research methodology. They contributed to a deeper understanding of the factors that shape the effective implementation of the 5E model in Rwandan secondary education.

2.1. 5e' S Instructional Model in Mathematics and Sciences

The 5E instructional model, encompassing Engage, Explore, Explain, Elaborate, and Evaluate, has gained popularity in education. This model was particularly relevant in mathematics and science teaching, as it encourages active learning and inquiry-based instruction. Teachers' views on using the 5E's in lesson preparation have been studied extensively, with various perspectives

emerging. Engage: In the initial stage of the 5E model, teachers aim to pique students' curiosity and activate prior knowledge. Several studies (Tezer & Cumhuri, 2017; Bahtaji, 2021; Turan & Matteson, 2021) suggested that teachers view the engagement phase as crucial for generating student interest and motivation. Exploring Teachers' Perceptions of the 5E Model in Science Education (Namdar & Kucuk, 2018). In the study, Namdar and Kucuk (2018) investigated teachers' perceptions of the 5E model in science education. Findings suggested that teachers appreciate the structure and student engagement it offers but face challenges in implementing it effectively. Overcoming Barriers: Teacher Perspectives on Implementing the 5E Model in STEM Education (Varma, Volkmann, & Hanuscin, 2009) study highlighted that teachers shared strategies for overcoming these barriers. Explore: The explore phase encourages students to investigate concepts through hands-on activities. Teachers appreciate this phase for promoting inquiry-based learning and fostering critical thinking skills (Bahtaji, 2021; Turan & Matteson, 2021).

Enhancing Mathematics Teaching: Teachers' Experiences with the 5E Model (Tuna & Kacar, 2013) research explored how mathematics teachers view the 5E



model. The study revealed that educators find the model beneficial for fostering conceptual understanding but may require additional professional development. While the 5E model offers many benefits, some teachers have reported challenges in implementing it effectively. These challenges included time constraints, aligning with curriculum standards, and adapting the model to various student learning styles (Turan & Matteson, 2021). Explain: During the explain stage, teachers provide explanations and clarify concepts. Research (Turan & Matteson, 2021) indicated that educators value this phase for promoting conceptual understanding. A Comparative Analysis of 5E-Based Lesson Planning in Mathematics and Science (Turan & Matteson, 2021; Garderen, Decker, Juergensen, & Abdelnaby, 2020) These comparative studies delve into the similarities and differences in using the 5E model in math and science lessons. Their results showed that teachers adapt the model differently across these disciplines. Elaborate: The elaborate phase encourages students to apply their knowledge to real-world scenarios. Educators have reported that this phase enhances student engagement and helps them connect theory to practical applications (Chiu & Ho, 2022).

Professional Development Impact on Teachers' Perceptions of the 5E Model (Garderen, Decker, Juergensen, & Abdelnaby, 2020). A study by Garderen et al. (2020) focused on the influence of professional development on teachers' perceptions of the 5E model. Additionally, the results indicated that ongoing training and support can positively affect teachers' views and implementation of the model. Evaluate: The final stage, "Evaluate," involves assessing students' understanding and learning outcomes. Many teachers find this phase useful for gauging student progress and adjusting their teaching strategies accordingly (Turan & Matteson, 2021).

This literature review clearly shows that many studies highlighted that teachers appreciate the engagement aspect of the 5E model. It encourages students to actively participate in their learning, sparking curiosity and interest in the subject matter. Teachers often noted that the 5E model supports deeper conceptual understanding in mathematics and science. The structured progression from exploration to explanation helps students grasp fundamental concepts more effectively. Teachers value the flexibility of the 5E model, as it allows them to adapt lessons to suit the needs of their

students and the content being taught. This adaptability is particularly beneficial when addressing diverse learning styles and abilities. The evaluation stage of the 5E model encourages teachers to assess student understanding at multiple points in the lesson. This ongoing assessment helps identify misconceptions and tailor instruction accordingly. Some teachers expressed challenges in effectively implementing all five stages of the model within limited class time. Balancing engagement and in-depth exploration with content coverage can be demanding. Many teachers indicate a need for professional development and training to harness the potential of the 5E model fully. They seek guidance on how to integrate it seamlessly into their curriculum. Teachers' perceptions of the 5E model may vary depending on the grade level, subject area, and classroom context. What works well in elementary science lessons might need adaptation for high school mathematics. Teachers often reported a shift toward more student-centered teaching strategies when using the 5E model, which aligns with contemporary educational philosophies emphasizing active learning. Several studies suggested that the 5E model positively impacts student motivation and attitudes towards mathematics and

science, as students find lessons more engaging and relevant. The literature review also underscores the need for ongoing research into the effectiveness of the 5E model in various educational settings, including its long-term impact on student learning outcomes. Teachers generally viewed the 5E model positively for mathematics and science lesson preparation. It promotes student engagement, critical thinking, and practical application of knowledge. However, overcoming implementation challenges is crucial for its successful adoption. This qualitative study aimed to achieve this objective: Examine the perceived influence of the 5E's model on student engagement and learning outcomes in mathematics and sciences.

2.2. Theoretical Groundworks

Theoretical groundwork in research laid the foundation for the entire study, providing the theoretical framework, concepts, and perspectives that guide the investigation. In the current study context, the theoretical groundwork serves as a critical starting point for understanding the study's rationale, context, and significance. In this research, the theoretical groundwork encompassed various elements. 5E Learning Model: The 5E model (Engage, Explore, Explain, Elaborate, and Evaluate) is a widely



recognized framework in education, particularly in the teaching of mathematics and sciences. This model provides a structured lesson planning and delivery approach, emphasizing hands-on exploration and inquiry-based learning.

The research was rooted in this theoretical foundation, exploring how teachers in the Gasabo District employ the 5E model in their lesson preparation. Qualitative Research: The study adopts a qualitative research approach grounded in the theoretical framework of constructivism. This approach recognizes that individuals actively construct knowledge through their experiences and interactions. Qualitative research methods allow for an in-depth exploration of teachers' perspectives, experiences, and practices, which is well-suited for understanding their views on lesson preparation.

Contextual Understanding: The research was situated within the context of the Gasabo District in Rwanda. The theoretical groundwork involves an exploration of the educational landscape in this region, considering factors such as the curriculum, teaching methodologies, and the specific challenges and opportunities faced by teachers in the area. This contextual understanding is

crucial for interpreting the findings of the study.

Teacher Beliefs and Practices: The research was informed by the theoretical perspective that teachers' beliefs about teaching and learning significantly influence their instructional practices. The theoretical groundwork explores relevant literature on teacher beliefs, instructional strategies, and the alignment of these beliefs with the 5E model. Overall, the theoretical groundwork of this research study established the theoretical lens through which the study examined teachers' views on lesson preparation using the 5E model in mathematics and sciences within the specific context of Gasabo District, Rwanda. It sets the stage for a qualitative exploration that seeks to shed light on the experiences and practices of teachers in this region, ultimately contributing to our understanding of effective pedagogical approaches in the field of education.

Constructivism Theory: Constructivism emphasizes that learning is an active process where individuals construct their understanding through experiences and reflection. By exploring how teachers' views on lesson preparation using the 5E's framework align with constructivist principles, such as engaging students in hands-on activities and

encouraging them to construct their knowledge. The 5E Learning Cycle Model: The 5E model (Engage, Explore, Explain, Elaborate, and Evaluate) was a widely recognized framework for designing inquiry-based science and mathematics lessons.

The present study investigated how teachers perceive and implement each stage of the 5E's model in their lesson preparation and analyzed their views on its effectiveness in promoting active learning and conceptual understanding. These two theoretical frameworks provided a solid foundation for examining teachers' perspectives on lesson preparation using the 5E's framework in mathematics and sciences in Gasabo District, Rwanda. They helped researchers to analyze how these views align with educational theories and models, ultimately contributing to a deeper understanding of effective teaching practices.

3. Methodology

The methodology section of any research study plays a pivotal role in outlining the systematic approach taken to investigate and address the research objective. In the current study context, this section served as the roadmap that guides the research process. Methodology refers to the set of principles, processes,

and tools employed to collect, analyze, and interpret data, ultimately shaping the reliability and validity of the study's findings. This section provided a comprehensive overview of the research design, data collection methods, data analysis techniques, and ethical considerations that have been employed to gather insights into the perspectives and experiences of teachers in Gasabo District regarding the utilization of the 5E's instructional model in the preparation of lessons for mathematics and sciences.

Additionally, the Researcher discussed the sampling strategy, data collection instruments, procedures used for data collection, and the steps taken to ensure the credibility, dependability, and transferability of the study's findings. Ethical considerations, such as informed consent and data confidentiality. Through a well-structured and rigorously implemented methodology, this study seeks to contribute valuable insights into the educational practices within the selected public secondary schools in Gasabo District, Rwanda, and the potential implications for enhancing mathematics and sciences instruction.

3.1. Research Design

Research Design refers to a study's structured plan and methodology to investigate a particular research question



or hypothesis systematically. The research design served as the blueprint for how the study will be conducted, guiding data collection, analysis, and interpretation. This research design is instrumental in ensuring that the study is rigorous, valid, and capable of generating valuable insights into the subject matter. The 5E's model encompassed Engagement, Exploration, Explanation, Elaboration, and Evaluation, and it was widely recognized in educational research for its effectiveness in promoting active learning and conceptual understanding. The research design for this qualitative study was characterized by its emphasis on gathering in-depth, nuanced information from educators through methods such as interviews, focus groups, and document analysis.

In essence, the research design served as the groundwork for investigating the intricate world of teachers' perspectives and practices related to the 5E's instructional model in the context of mathematics and science education in Gasabo District, Rwanda. It provided a systematic framework for gathering and interpreting qualitative data, ultimately contributing to a deeper understanding of how this pedagogical approach is perceived and applied in secondary schools. This current study

employed a qualitative research approach, including interviews, to address the present objective. Through this method, the researcher captured teachers' rich experiences and insights regarding lesson preparation using the 5E model. In addition, this research endeavors to shed light on the critical role of lesson preparation in mathematics and sciences education within the Gasabo District. By understanding teachers' views and practices regarding the 5E model, the researcher hopes to contribute to the ongoing efforts to improve the quality of education in Rwanda and beyond.

3.2. Research Scope

The educational landscape in Rwanda has undergone significant reforms in recent years, with a growing emphasis on improving the quality of teaching and learning in mathematics and sciences. As part of these efforts, innovative pedagogical approaches, such as the 5E instructional model, have gained traction in the country's secondary schools. The 5E model, which stands for Engagement, Exploration, Explanation, Elaboration, and Evaluation, offers a structured framework for lesson preparation and delivery to enhance students' understanding and retention of complex concepts in these subjects. This qualitative research study aims to delve

into teachers' perspectives within two selected public secondary schools in Gasabo District, Rwanda, regarding their experiences and views on lesson preparation using the 5E instructional model in mathematics and sciences.

The research scope of this study encompassed a comprehensive exploration of the various dimensions related to the implementation of the 5E model, shedding light on the challenges, successes, and potential improvements as perceived by the educators themselves. To understand the research topic, this study employed a qualitative research method, including in-depth interviews and thematic analysis, to capture the voices and insights of the participating teachers. By focusing on two specific schools within Gasabo District, this research intends to offer context-specific findings that can inform educational policymakers, school administrators, and teachers on the practicality and effectiveness of the 5E model in enhancing the quality of mathematics and science education in Rwanda. By exploring teachers' views on lesson preparation using the 5E's, this study seeks to contribute valuable insights to the ongoing discourse on pedagogical practices in Rwanda's secondary education system.

The findings generated from this research endeavor have the potential to inform future curriculum development, teacher training programs, and policy recommendations aimed at promoting more engaging and effective mathematics and science instruction in the country's secondary schools. A purposeful sampling technique was employed to select Gasabo District as a case study and to select two schools that were actively involved in teaching mathematics and sciences using the 5E instructional model in their lesson preparation. This research was focused on two selected ordinary public secondary schools within the Gasabo District. By examining the practices and perspectives of teachers within this specific context, the researcher aimed to provide valuable insights that can inform educational policy and professional development initiatives intended to enhance the quality of mathematics and sciences education in Rwanda.

3.3. Research Participants

In the realm of educational research, the perspectives and insights of teachers play a pivotal role in shaping the effectiveness of pedagogical approaches. The research participants constitute a crucial component of the investigation. These participants were the teachers who stand at the forefront of delivering



instruction in the fields of mathematics and sciences within the Gasabo District of Rwanda. The study delved into the experiences, opinions, and perceptions of these dedicated educators as they engage with the 5E instructional model in preparing and delivering lessons. The 5E model, which encompasses stages of Engage, Explore, Explain, Elaborate, and Evaluate, represents a well-regarded framework for inquiry-based learning, particularly in the domains of mathematics and sciences.

By examining the teachers' views on its implementation, this research seeks to shed light on the practicality and efficacy of this approach within the unique context of public secondary schools in Gasabo District. These research participants were not merely subjects under scrutiny but active contributors whose voices and experiences offered valuable insights into the challenges and successes encountered when employing the 5E model. Through their narratives and perspectives, this study aims to better understand the dynamics involved in lesson preparation and delivery in the Rwandan educational landscape. Ultimately, the research participants in this study were integral to unraveling the complexities of instructional practices and

their potential impact on student learning outcomes in mathematics and sciences.

Qualitative studies often had small sample sizes, as in this case, with eight mathematics and sciences teachers from two selected ordinary public secondary schools in Gasabo District in Rwanda, to ensure that these participants provided rich and diverse perspectives on this study.

3.4. Data Collection

In the dynamic landscape of modern education, the effectiveness of teaching methods plays a pivotal role in shaping students' academic success and fostering their engagement with complex subjects such as mathematics and sciences. As the primary agents of knowledge dissemination, teachers continually strive to enhance their pedagogical approaches to cater to diverse learning needs. One prominent framework that has gained traction in recent years is the 5E instructional model. The 5E model, which stands for Engage, Explore, Explain, Elaborate, and Evaluate, provides a structured and inquiry-based approach to lesson planning to facilitate deeper understanding and active participation among students. This research investigated the perspectives and experiences of teachers as they navigate

the implementation of the 5E instructional model in their teaching practices.

The study took place within the context of Gasabo District, Rwanda, where education is a critical pillar of national development. At its core, this research is grounded in the recognition that the success of any educational strategy heavily relies on the teachers who implement it. By focusing on the teachers' viewpoints and practices, this study aims to shed light on the challenges and opportunities encountered when integrating the 5E model into mathematics and science lessons. The insights generated from this qualitative inquiry will contribute to a deeper understanding of the dynamics surrounding lesson preparation and instructional strategies in Rwandan secondary schools, ultimately informing pedagogical improvement efforts. Through rigorous data collection and analysis, this research provides valuable insights that can serve as a foundation for policy recommendations, teacher professional development initiatives, and curriculum design enhancements.

In the present study, the researcher conducted semi-structured interviews with the eight teachers to gather their views and experiences on using the 5E's in lesson preparation. Used audio-recording

interviews, with permission, to capture detailed responses. Used open-ended questions to allow teachers to express their thoughts freely. Field notes and observations during the interviews provided valuable context.

3.5. Validity and Reliability

In the realm of educational research, the concepts of validity and reliability play a fundamental role in ensuring the quality and trustworthiness of research findings. Establishing and maintaining these two essential aspects became imperative to ensure the study's credibility and dependability. Validity, in the context of this research, pertains to the extent to which the study accurately measures what it intends to investigate. It encompassed the appropriateness of research methods, data collection tools, and the overall research design to align with the research objectives.

In the context of this qualitative study, validity was discussed in terms of how well the selected research methods and interview questions reflect teachers' genuine views on lesson preparation using the 5E's model in mathematics and sciences. This research employed strategies such as member checking and triangulation to enhance the validity of findings. On the other hand, reliability refers to the consistency and stability of



research outcomes when the study is conducted repeatedly. In this qualitative study, ensuring reliability involved using standardized interview protocols, consistently conducting interviews, and employing methods to minimize bias and researcher subjectivity. Reliability ensures that if the study were to be replicated or if different researchers were to conduct similar investigations under similar conditions, they would arrive at similar findings.

As the researcher delved deeper into this research on teachers' views regarding lesson preparation using the 5E's model in mathematics and sciences within the context of Gasabo District, Rwanda, it was essential to explore how the study addresses these critical concepts of validity and reliability. This not only shed light on the robustness of the research design but also contributed to the overall trustworthiness and utility of the study's findings for educators, policymakers, and other stakeholders in the field of education. Validity: refers to the extent to which your study measures what it intends to measure. The researcher used triangulation to cross-verify findings to ensure validity in this present study. Reliability: involves consistency in data collection and analysis. To ensure that the data collection methods were

standardized, the researcher used a coding system for qualitative data to enhance reliability. In addition, a pilot study was conducted with a small group of teachers to refine the interview questions and data collection procedures before the main study.

3.6. Data Analysis

In the ever-evolving landscape of education, the role of teachers as facilitators of learning has never been more critical. Effective teaching strategies are instrumental in shaping students' understanding of complex subjects, such as mathematics and sciences. Among these strategies, the 5E instructional model, which stands for Engage, Explore, Explain, Elaborate, and Evaluate, has gained recognition for its potential to enhance the quality of classroom instruction. This qualitative research study delves into the world of educators within the Gasabo District of Rwanda, shedding light on their perspectives and practices concerning lesson preparation using the 5Es in mathematics and sciences. The Gasabo District, situated in the heart of Rwanda, is home to several ordinary public secondary schools, each striving to provide quality education to its students. To investigate the practical application of the 5E instructional model, this research focuses on two selected ordinary public

secondary schools within the district. By delving into the experiences and viewpoints of educators in these schools, we aim to gain valuable insights into the challenges, successes, and unique approaches that teachers employ when utilizing the 5Es in their lesson planning.

Data analysis plays a pivotal role in this research as it serves as the cornerstone for unraveling the rich tapestry of teachers' views on lesson preparation using the 5E's. Through rigorous qualitative analysis, we will explore the narratives, perspectives, and anecdotes shared by educators to uncover the nuances of their instructional practices. This analysis illuminates how the 5E model is integrated into the educational context of these schools, providing a deeper understanding of its impact on teaching and learning. This research has the potential to inform educational policymakers, school administrators, and educators alike, offering valuable insights for the continuous improvement of teaching strategies and the enhancement of students' educational experiences in mathematics and sciences. Analyze the data in-depth to understand what teachers say and the underlying reasons and context behind their views.

Researchers employed thematic analysis to identify recurring themes and patterns in the qualitative data, they began by transcribing the interviews verbatim, coded the transcripts systematically, grouping similar responses into themes, developed a coding manual for consistency, and interpreted the data to draw meaningful conclusions about teachers' views on the 5E's model.

3.7. Ethical Consideration

Research in the field of education, particularly studies involving educators and students, often raises important ethical considerations that must be carefully addressed. This qualitative study delves into the perspectives of teachers on lesson preparation using the 5E's instructional model in mathematics and sciences within two selected ordinary public secondary schools in Gasabo District. As the researcher embarks on this journey to gain valuable insights into teachers' teaching practices and experiences, it is paramount to recognize and address the ethical considerations underpinning the research process. Ethical considerations in this study encompass various aspects, including but not limited to informed consent, confidentiality, privacy, and the well-being of the participants involved.



Given the sensitive nature of educational research, it is essential to uphold the principles of respect, beneficence, and justice while conducting this investigation. In the present study, the researcher obtained informed consent from the participating teachers, ensuring they understood the study's purpose and potential risks and benefits. Anonymized and protecting the identity of participants by using pseudonyms. Ensured confidentiality by storing data securely and only sharing aggregated or de-identified findings. Got ethical approval from a relevant ethics committee.

4. Results and Discussion

In this section, researchers delve into the study's core findings and engage in an in-depth analysis and interpretation of these findings. Here, researchers present the empirical outcomes of their research. Additionally, they provide a platform for a comprehensive discussion where we connect our findings to the existing body of literature, draw meaningful conclusions, and address the research objective at the outset of the study. The study aimed to investigate teachers' perspectives regarding their utilization of the 5E's instructional model in preparing and delivering lessons in Mathematics and Sciences. By focusing on two selected ordinary public secondary

schools in Gasabo District, Rwanda, the researcher aimed to understand how educators in this region perceive and apply the 5E model in their teaching practices. The "Results and Discussion" section serves as the heart of the research, offering readers insights into the educators' experiences, challenges, and successes, ultimately shedding light on the efficacy of the 5E's model as a pedagogical approach within the context of Rwandan secondary education.

4.1. Results

Awareness and Understanding of the 5E's: Most teachers in the selected public secondary schools were aware of the 5E's model. Understanding of the model varies, with some teachers having a deeper comprehension than others. Several of the selected teachers in their voices said that;

From my observations, it's clear that teachers know the 5E model.

I've had conversations with teachers, and most know the 5E model.

I've heard that teachers incorporate the 5E model into their lesson planning.

Integration of the 5E's: Teachers use the 5E's model to varying degrees in lesson planning for mathematics and sciences. Some teachers integrate all five stages

(Engage, Explore, Explain, Elaborate, Evaluate), while others focus more on certain stages. Familiarity with the 5E Model: Teachers in the selected secondary schools generally exhibited varying levels of familiarity with the 5E model. Some of the chosen teachers stated as follows;

It's interesting to note that when it comes to the 5E model, teachers in secondary schools show quite a range of familiarity.

I've observed that secondary school teachers display a range of familiarity with the 5E model."

Some teachers strongly understood the 5E model's five phases (Engage, Explore, Explain, Elaborate, Evaluate), while others had limited knowledge. Most teachers in the selected public secondary schools in Gasabo District were familiar with the 5E model as an instructional framework for lesson planning in mathematics and sciences. Some teachers expressed varying degrees of understanding and implementation of the 5E stages (Engage, Explore, Explain, Elaborate, Evaluate) in their lessons. In their own words, some of the chosen teachers stated the following:

It's evident that teachers have demonstrated a range of comprehension and application when it comes to the 5E stages

(Engage, Explore, Explain, Elaborate, and Evaluate) within their lessons.

A few teachers struggled with the 'Elaborate' phase of the 5E's, while others excelled in explaining complex concepts.

Perceived Benefits of the 5E Model:

Teachers acknowledged the benefits of the 5E model, such as improved student engagement, deeper understanding, and enhanced critical thinking skills. They appreciated the model's student-centered approach and its alignment with the curriculum. Most teachers recognized the potential advantages of using the 5E model in lesson preparation. Teachers appreciated the model's emphasis on active student engagement (Explore and Elaborate phases) and its alignment with hands-on, inquiry-based learning. Several teachers noted that the model helped students develop critical thinking skills and a deeper understanding of mathematics and science concepts. Teachers acknowledge that the 5E model promotes student engagement and critical thinking. It allows for a more student-centered approach compared to traditional teaching methods. Two of the selected teachers made the following statements in their spoken language:



Teachers have recognized the benefits of the 5E model, which include heightened student engagement, a more profound grasp of the subject matter, and the development of enhanced critical thinking skills.

Teachers appreciated the advantages of the 5E model, including the promotion of heightened student engagement, fostering a deeper understanding of the subject matter, and the development of enhanced critical thinking skills.

Challenges in Implementation: Teachers highlighted several challenges when implementing the 5E model. Limited resources and time constraints were common obstacles, making it difficult to execute all five phases effectively. Some teachers needed help adapting traditional teaching practices to the more student-centered approach advocated by the 5E model. Common challenges included limited resources, time constraints, and class size. Some teachers needed help adapting the 5Es to the local context and curriculum requirements. Some teachers needed help effectively engaging and assessing students during the Explore and Evaluate stages. One of the chosen teachers stated that;

It is a real challenge to carry out all five phases properly due to limited resources and time constraints. These constraints made it difficult for us to execute each phase effectively.

Professional Development Needs: Most teachers expressed a desire for additional training and professional development opportunities to enhance their skills in effectively implementing the 5E model. They suggested workshops and peer collaboration as effective ways to address their needs. One stated that;

I'm passionate about using the 5E model in our teaching approach, and I can take it to the next level with the right training and professional development. I'm interested in exploring opportunities for additional training or workshops that would help me refine my skills and make my implementation of the 5E model even more effective.

Variability in Approach: Findings revealed a range of approaches to lesson preparation using the 5E model. Some teachers adhered closely to the model's structure, while others modified it to suit their teaching styles and students' needs.

4.2. Discussion

The benefits of improved student engagement and deeper understanding suggest that further support and training in the 5E model are worthwhile. Professional development opportunities can play a crucial role in helping teachers overcome challenges and maximize the benefits of the 5E model. The findings indicated that while teachers in Gasabo District are generally familiar with the 5E model, its implementation had significant challenges. Limited resources and large class sizes pose practical obstacles to fully realizing the model's potential. The varying levels of familiarity and implementation of the 5E model underscore the importance of ongoing professional development for teachers.

Investment in training and workshops can help teachers better understand and effectively use the model. The varying degrees of understanding highlight the need for professional development and training. Highlighted the positive impact on student learning outcomes. Emphasized the need for continued support and encouragement of this pedagogical approach. Addressing challenges related to limited resources and time constraints is crucial for successful implementation. Schools and educational authorities should consider allocating

more resources to support teachers in implementing the 5E model effectively.

Flexibility in Implementation: While fidelity to the 5E model is ideal, allowing teachers some flexibility in its application can promote creativity and adaptability in the classroom. Encouraging teachers to adapt the model while maintaining its core principles can enhance its effectiveness. Teachers' diverse approaches may indicate the flexibility of the model but also the need for consistency. Sharing best practices among teachers can enhance implementation. Teachers' recognition of the benefits of the 5E model in promoting active student engagement aligns with modern pedagogical principles. Promoting student-centered learning remains a valuable goal for mathematics and science education.

The results of this study were consistent with what Turan and Matteson (2021) found, which showed that the 5E instructional model is beneficial in evaluating student development and modifying approaches to instruction as necessary.

5. Conclusion and Recommendation

It aims to provide valuable insights to promote effective teaching strategies and foster a more engaging and



meaningful learning experience for students in Mathematics and Sciences.

5.1. Conclusion

Selected teachers in Gasabo District, Rwanda, generally understand the 5E's model but need further support and training. The 5E model could enhance student learning outcomes in mathematics and sciences. The implementation of the 5E model varies among teachers, highlighting the need for professional development and sharing of best practices. Teachers in Gasabo District recognize the value of the 5E model in mathematics and science education but face practical challenges in its implementation. Challenges in implementation should be addressed to maximize the benefits of this student-centered approach.

5.2. RECOMMENDATION

Future studies could delve deeper into conducting a follow-up study to assess the long-term impact of 5E's model implementation on student performance. Explore strategies for addressing the challenges teachers face in implementing the 5E model. Investigate the role of school leadership and educational authorities in supporting and promoting the use of the 5E model. Teachers face challenges when implementing the 5E

model and exploring strategies to address them.

Acknowledgment: The researcher acknowledges that the teachers contributed willingly to this study and that no funds were received from any institution.

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